# SELECTION OF SYSTEMS TO PERFORM EXTRAVEHICULAR ACTIVITIES

Man and Manipulator Volume 1 PERFORMANCE EFFECTIVENESS **EVALUATION SCHEME (PEEVS)** PART B REFERENCE DATA (THRU) FORM 602 (CODE) (PAGES) CR-102 CATEGORY)

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#### SELECTION OF SYSTEMS TO PERFORM EXTRAVEHICULAR ACTIVITIES Man and Manipulator Contract No. NAS8-24384

Volume 1 - Performance Effectiveness Evaluation Scheme (PEEVS)

Part B - Reference Data

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#### **FOREWORD**

The following represents work which was performed on a study of Man vs Manipulator Functions and is the Guidebook on Contract NASS-24384, National Aeronautics and Space Administration, Marshall Space Flight Center, Alabama.

This volume (one of two volumes) has three separately bound parts. Part A contains instructions for using the Performance Effectiveness Evaluation Scheme (PEEVS). Part B contains PEEVS Reference Data Sheets. Part C contains the worksheets required to use PEEVS.



#### **ACKNOWLEDGEMENTS**

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#### 3.0 DEFINITION OF EXTRAVEHICULAR (EV) FUNCTIONS

Twelve FSAS Mission Functions are defined below. For this analysis consider each Function as a complete unit starting when the FSAS is prepared to perform the function and ending when the FSAS is stowed. Therefore, while activities such as translation and cargo transfer might be required to perform a function such as "Remove/Replace," they should not be included as EV Functions unless they are major objectives. All functions except "Repair," "Translation," "Astronaut Rescue," and "Satellite Recovery" are conducted at prepared worksites.

#### a) Deploy

During the mission, an FSAS will be required to extend or arrange hardware in the EV environment.

#### b) Remove/Replace

During the mission, an FSAS will be required to take units out of and/or replace into a special receptacle in the EV environment.

#### c) Inspect

During the mission, an FSAS will be required to closely examine system status in the EV environment.

#### d) Cargo Transfer

During the mission, an FSAS will be required to move material from one point in space to another.

#### e) Maintain

During the mission, the FSAS will be required to perform periodic, planned system referbishment.

#### f) Assemble

During the mission, the FSAS will be required to fit together parts of specific systems.

#### g) Repair

During the mission, the FSAS will be required to inspect, diagnose, and carry out appropriate corrective action on specific space systems.

#### h) Operate/Monitor

During the mission, the FSAS will be required to cause to function, and observe the functioning of, selected space systems.



#### i) Data Acquisition

During the mission, the FSAS will be required to direct, operate, and monitor data recording systems.

#### j) Satellite Recovery

During the mission, the FSAS will be required to intercept, attach to, and possibly transfer unmanned satellites from one point in space to another.

#### k) Astronaut Rescue

During the mission, the FSAS may be required to safely release trapped and/or transfer disabled astronauts from an extravehicular to an intravehicular environment.

#### 1) Translation

During the selected mission, the FSAS will be required to safely move healthy astronauts from one point in space to another.



## 4.0 DEFINITION OF PERFORMANCE EFFECTIVENESS AND COST MEASURES

The following tables list the performance effectiveness and cost measures provided for use in the evaluation of candidate FSAS. These tables are (reduced) duplicates of the Step III worksheets. Therefore, when a measure is selected for inclusion in the analysis, check it on the Step III worksheet.

Provided with each measure is a matrix which cross-references the measure to applicable EV functions. Also, the measure is defined, and both interval scale and rating scale units are given.

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EXTRAVEHICULAR FUNCTIONS

L	Deploy Remove/Replace Inspect Cargo Transfer Maintain																
	epioy emove/Replace	Nemove/					Astronaut Rescue	Translation	STEP III Definitions of Performance Effectiveness and Cost Measures								
3-	-	-	-		<del>-</del> +	-	_	_		-	-	MEA SURE		DEFINITION		UNIT ·	ск
7	$Z \nabla$	42	$ \nabla $	$\Delta$	$\nabla \Gamma$	$\mathbb{Z}$	$\nabla$	$\nabla$	$\nabla$	$\nabla$	$\nabla$	<del></del>			Interval Scale	Rating Scale	
	•	•		•	•	•	•	•	•		•	Operational Lifetime	С	The expected duration of system usefulness. This refers to operational or "up" time only. The expenditure of irreplaceable consumables or the liklihood of failure in a critical subsystem or component usually delimits this measure.	Time - Standard Units (years, months, etc.)	1. Unlimited 2. Short term 3. One time Unknown	
į	•	•	•	•	•	•	•	o	•	•		On-Site Time Limit	P	The upper limit on the duration of stay at a worksite.  Limit may be imposed by astronaut or system constraints such as energy expenditure or consumable replenishment requirements.	Time - Standard Units (hours, minutes, etc.)	1. Unlimited 2. Limited-Long Term 3. Limited-Short Term Unknown	
		•		•		•	•		Worksite Flexability	P	The capability of an Extravehicular System to be used at un- planned worksites. That is, to provide translation and transportation between, and stabilization and actuation at a site which has no special hardware for FSAS interface.		1. Unlimited 2. Limited—Special Interface 3. Prepared Worksite Only Unknown	, " (g) (G) &			
·		•	•	•	٠	•	•	٠	•	•	۰	Range	p	Distance from the FSAS origin on the prime vehicle (e.g., astronaut EVA ingress/egress hatch or remote manipulator stowed position) to the maximum point at which a worksite may be located.	Lineal - Standard Units (miles, feet, etc.)	1. Unlimited 2. Limited-Medium Range 3. Close Proximity Unknown	が表めて
	•	•	•	¢	•	•	٠	•	•	•	٠	Environmental Flexibility	P	The proportion of the expected extravehicular environment in which the FSAS could operate. Factors such as high radiation levels could preclude the use of certain systems.		1. Unlimited 2. Limited (Specific conditions) Unknown	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
	•	•	•	•	•	•	•	•	•	•	•	Dependability	P	The confidence that may be placed in a system's performing its assigned functions when called upon to do so. Lack of confidence will result in a requirement for a redundant or backup system to perform the mission.	Reliability - Stan- dard Units (MBTF, etc.)	1. No Redundancy Required 2. Redundancy Required Unknown	, ,
		•	•	•	•	•	•	•	•	o	•	Crew Requirements	С	The number of crewmen who must devote full time and attention to FSAS operations. Their roles might be actuation, cargo transport, system support, or backup operations.	Number of Crewmen		
			۰	•	•	•	•	•	۰	•	•	Expendable Requirements	С	Resources required to operate an FSAS per unit time, includ- ing life support consumables, propellant, etc. It is assumed that depletion of the expendables will prevent FSAS use.	Weight per Unit Time (pounds per stan- dard mission)	1. Low 2. Medium 3. High Unknown	

C - Cost Measure

P - Performance Effectiveness Measure

EXTRAVEHICULAR FUNCTIONS

STEP III Definitions of Performance Effectiveness and Cost Measures

Denlov	Remove/Re	Inspect	Cargo Tre	Maıntain	Assemble	Repair	Operate/	Data Acqu	Satellite	stronaut	Translati		Na Charles de				<b>.</b>
			1	î D		Ε.				-		MEA SURE		DEFINITION	UNIT		_l⋅cĸ
$\mathbf{P}$	ľΩ	V	Y	Y	$\nabla$	V	V	$\nabla$	V	ĮΥ	44	ļ			Interval Scale	Rating Scale	
•	•	٠	•	•	•	•	•	•	•		•	Emergency Provisions	P	Backup systems required to safely terminate the FSAS mission given a major subsystem failure. Of primary concern is the safe return of an EVA astronaut to the prime vehicle.		None Required     Integral to System     Extra     Unknown	)
•		٠	•	•	٠	•	•	•	•	•	•	Mass	С	Earth (1-G) weight of the FSAS, less expendables.	Weight (1-G)-For a Standard Mission (pounds, ounces, etc.)	1. Light 2. Hoderate 3. Heavy Unknown	A STANCE
	•	•	•	•	•	•	•	•	•		•	Maintenance Time Requirements	С	Percentage of time in orbit when the FSAS will be inoperative because of servicing, preventive maintenance, or repair.		1. None 2. Infrequent 3. Frequent Unknown	٠,
	•	•	•	•	•	•	•	•	•	•	•	Stowed Volume	С	Amount of space occupied by the FSAS while in a stowed configuration. This space will define the requirements for FSAS transport and orbital stowage.	Volume - For a Stan- dard Mission (Cubic feet, etc.)	1. Small 2. Moderate 3. Large Unknown	( ·
ŀ		. * Pa	٠	•	•	•	•	٠	•	•	•	Average Translation Velocity	P	The average rate at which an FSAS wall move between points. In some cases an FSAS can traverse at a higher rate; how-ever, safety, comfort, and rate of expendable consumption must be considered.	Velocity - Standard Units (Feet per second)	1. Fast 2. Medium 3. Slow Unknown	ř
·	•	•	٠	•	٠	•	•	•	•	•		Translation Rate Control	P	The maximum acceleration/deceleration rate available to the FSAS.	Acceleration, Deceleration - Standard Units (Feet per second <sup>2</sup> )	1. High 2. Medium 3. Low Unknown	
Ŀ	•	٠	•	•	•	•	. •	•	•	•	•	Translation Stability	Р	Average time required for an FSAS to return to a programmed attitude after being offset.	Time (minutes, seconds) - Standard offset FM = $\sqrt{\text{Tp}^2 + \text{Ty}^2 + \text{Tr}^2}$	1. Stable 2. Moderate Stability 3. Instable Unknown	
L			•	•		•			•		•	Translation Maneuverability	Р	Rate with which an FSAS can change direction to avoid an obstacle, to select a different worksite, or to follow a preprogrammed flight path.	Angular Accelera- tion - Standard Units (Degrees per second <sup>2</sup> )	1. High 2. Medium 3. Low Unknown	

C - Cost Measure P - Performance Effectiveness Measure

STEP	Ш	Definitions of Performance Effectiveness and Cost Measure
JILI	143	Definitions of Performance Effectiveness and Cost Measur

_		DATION TO THE TOTAL TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO TH									1										
Denlov	move/Replace	Remove/Replace Inspect Cargo Transfer Maintain Assemble Repair Operate/Monitor Data Acquisition Satellite Recovery									anslation	STEP III Definitions of Performance Effectiveness and Cost Measures									
-	+	ū	ಭ	Ma	AS	솔	å	Da Da	_	-	Ë	MEA SURE		DEFINITION		UNIT	СК				
$\nabla$	$\nabla$	$\nabla$	$\nabla$	$\nabla$	$\nabla$	$\nabla$	$\nabla$	V	$\nabla$	$\nabla$	$\nabla$	, FILAGORE		DEFARICION	Interval Scale	Rating Scale	,				
	•			٠	•	•			٥			Actuation Force (Normal)	P	The maximum force which can be applied by an actuator at a worksite. This force is, for an astronaut, in the push-pull direction.	Force - Standard Units (Pounds)	1. High 2. Moderate 3. Low Unknown	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
	•			٠	•	•			•	•		Actuation Force (Rotation)	P	The maximum sustained force which can be applied by an actuator at a worksite. This force is, for an astronaut, a wrist rotation.	Torque - Standard Units (e.g., foot- pounds)	1. High 2. Moderate 3. Low Unknown	4,4				
	•		•		•	•			•	•		Worksite Mass Handling Limit	P	The maximum package weight (1-G) which can be safely moved by an actuator between points at a worksite.	Weight - Standard Units (pounds)	1. Heavy 2. Moderate 3. Light					
	•		•		•	•			•	•		Worksite Size Handling Limit	P	The maximum package size which can be safely handled by an actuator at a worksite.	Length, Width, and Breadth (Feet, inches) FM = L x W x B	1. Large 2. Moderate 3. Small Unknown	, (				
	•		•		•	•	•	•	•	•		Actuator Position Accuracy	P	Average difference between actual and preprogrammed actuator position.	Error (E) - Lineal (Inches, etc.) $FM = K \sqrt{E_X^2 + E_Y^2 + E_Z^2}$	1. Accurate 2. Moderate 3. Inaccurate Unknown					
	•		•		•	*	•	•		•		Actuator Orientation Accuracy	p	Average difference between actual and preprogrammed actuator orientation.	Error - Rotational (Degrees, etc.) $FM = K \sqrt{E_p^2 + E_y^2 + E_r^2}$	1. Accurate 2. Moderate 3. Inaccurate Unknown					
	•			•	•	•			•	•		Worksite Reach Envelope	P	The surface describing the points around a worksite within the reach of an actuator.	Sum of reach dis- tances on body axes.	1. Large 2. Medium 3. Small Unknown					
[.	•		•	•	•	•		•		•		Cargo Transport , Range	p ,	The distance over which cargo may be transported.	Distance - Standard Units (Feet, etc.)	1. Unlimited 2. Lamited-Medium Range 3. Lamited-Close Prox- imity					

EXTRAVEHICULAR FUNCTIONS

C - Cost Measure P - Performance Effectiveness Measure

## STEP III Definitions of Performance Effectiveness and Cost Measures

_																								
Deploy	Remove/Replace	Inspect	Cargo Transfer	Maintain	Assemble	Repair	Operate/Monitor	Data Acquisition	Satellite Recovery	Astronaut Rescue	Translation		STEP III Definitions of Performance Effectiveness and Cost Measures											
-	+	$\vdash$		$\nabla$		$\nabla$		$\nabla$	+-	$\nabla$		MEA SURE		DEFINITION		UNIT	ск							
1	'V	Y	ΙΥ.	Y	Y	Y	V	V.	V	ĮΥ	IV.	<del></del>	_		Interval Scale	Rating Scale	+							
Ŀ		•	•	•	•	•	•	•	•	•	•	Visibility	р	The percentage of the visual field which is unobstructed by the FSAS and associated hardware.	FM = (% of Visual Field)	1. Unobstructed 2. Obstructed 3. Very limited Unknown	50° 140							
ŀ	•	•	•	•	•	٠	•	•	•	•	•	Deployed Volume	С	The space taken up by an FSAS once it is deployed.	Volume - For a Stan- dard Mission (Cubic feet)		(k)							
	•		•						•	•		Transport Velocity	P	The rate with which materials can be moved by the FSAS between points in space.	Velocity - For a Standard Mission (Feet/second)	1. Fast 2. Medium 3. Slow Unknown								
Ŀ			•			٠			•	•		Cargo Hass Limit	Р	The maximum cargo weight (1-G) that can be transported by an FSAS between points in space.	Weight - Standard Units (Pounds, etc.)	1. Heavy 2. Moderate 3. Low Unknown								
<b>.</b>	•		•	•		•			•	•		Cargo Stabilization	P	Average time required for an FSAS to return to a programmed attitude after being offset.	Time (minutes, seconds) - Standard mass and offset FM = VTp2+Ty2+Tr2	1. Stable 2. Moderate Stability 3. Unstable Unknown	3							
ŀ	•		•			•			•	•		 Cargo Size	P	The maximum cargo volume that can be transported by an FSAS between points in space.	Volume in Standard Units (Cubic feet)	1. Large 2. Medium 3. Small Unknown								
Ŀ	•		•	•	•	•	•	•	•	•		Worksite Stability (Normal)	P	The maximum force counteracted in lateral axes.	Force Reacted-Stan- dard Units (pounds) $FM = K \sqrt{F_X^2 + F_y^2 + F_z^2}$	1. Stable 2. Moderate Stability 3. Unstable Unknown'	•							
ŀ	•		•	•	•	٠	٠	•	٠	•		Worksite Stability (Rotation)	Р	The maximum force counteracted in rotation about the axis normal to the worksite.	Force Reacted-Stan- dard Units (Foot- pounds)	l, Stable 2. Moderate Stability 3. Unstable Unknown								

EXTRAVEHICULAR FUNCTIONS

C - Cost Measure P - Performance Effectiveness Measure



## 5.0 FREE SPACE ACTIVITY SYSTEM SPECIFICATION AND DATA SHEETS

The following tables include interval and rating scale data gathered on each Free Space Activity System reviewed. Both EVA subsystem and EV system data are provided (paragraphs 5.1 and 5.2, respectively).

Notes identified in the data blocks are given on Sheet B of each (a, b) pair.

#### 5.1 EVA SUBSYSTEM DATA SHEETS

Tránslation Handrails and Handholds	5-1-1 (a, b)
Handheld Maneuvering Unit (HHMU)	5-1-2 (a, b)
Astronaut Maneuvering Unit (AMU)	5-1-3 (a, b)
Automatic Stabilized Maneuvering Unit (ASMU)	5-1-4 (a, b)
Translation Trolley	5-1-5 (a, b)
Servo Powered Hardsuit	5-1-6 (a, b)
Unaided Astronaut (Actuator)	5-1-7 (a, b)
Stabilization Handrails and Handholds	5-1-8 (a, b)
Dutch Shoes	5-1-9 (a, b)
Handrails/Foot Restraints	5-1-10(a, b)
Maintenance Waist Restraint	5-1-11(a, b)
Variable Flexibility Tether	5-1-12(a, b)
Boom Attachment	5-1-13(a, b)
Astrogrid Shoes	5-1-14(a, b)
STEM for Cargo Transfer	5-1-15(a, b)
Handrails for Cargo Transfer	5-1-16(a, b)
Dolly & Rails for Cargo Transfer	5-1-17(a, b)
Personnel Harness & Rails	5-1-18(a, b)
Clothesline	5-1-19(a, b)



	FREE SPACE ACTIVI	rv		SUBSYSTEM NOMENCLATURE			
	SYSTEMS DATA SHE		DEV 5	RAILS			
OPI RATIONAL	L LIFETIME	EMERGENCY P	ROVISIONS	ACTUATION FORCE (NORMAL)			
Interval	Rating '	Interval	Rating	Interval	Ratine		
	l-Unlimited.		l-None Req'd.				
, No	otes	No.	tes .	· \otes ·			
ON-SITE T	IME_LIMIT	- MAS	S	ACTUATION FOR	CL (ROTVILON)		
Interval	Rating	Interval	Rating	Interval	Raturg		
	1-Unlimited	100 lbs	l'-Light				
No	otes	, No (2)	tes		otes N/A · · ·		
WORKSITE D	LEXIBILITY	MA'INTI NANCE TIM	E REQUIREMENTS	WORKSITE MASS	HVMDLING LIMET		
Interval	Rating	Interval	Rating	Interval	Rat on:		
		None	l-None		,		
	otes , N/A	. No	tes		otes N/A		
RV	NGE	STOWED	VOLUME	WORKSITE SIZE	HANDLING LIMIT		
Interval	Rating	Interval	Rating	Interval	Ratino		
60 ft(E)	3-Close Prox.	995 in <sup>3</sup> (E)	1-Small	: 			
No (1)	otes .	λο: . (2)	tes .		otes N/A		
ENVIRONMENTA	L FLEXIBILITY	AVERACE TRANSLA	TION VELOCITY	ACTUATOR POSI	TION ACCURACY		
[nterval	Rating	Interval	Rating	Interval	Raitae		
<b>'</b>	1-Unlimited	2 ft/sec (E)	3-Slow	,			
, %c	tes	No.	tes	\otes N/A			
, PEPEND	\BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACE			
Interval	Rating	Interval	Rating	Interval	Ratine		
	1-No Redund.		l⊸Hıgh		,		
- No	otes	No	tes	*	otes N/A		
CREW REQ	UIREMENTS	TRINSLATION	STA BILITY	WORKSITE RE	ACH ENVFLOPE		
Interval	Rating	Interval,	Rating	Interval	Rating		
			l-Stable	,			
8	otes N/A	No	tes		n/A		
EXPENDA BLE	REQUIREMENTS	TRANSLATION MA	NEUVERABILITY	CARGO TRANSPORT RANGL			
Interval	Rating	Interval	Rating	Înterval	Rating		
	1-Low		1-High*				
No.	otes	No *Select	tes route	Notes N/A			

LEGEND: P — Published Data · T — Typical
E — Estimate Mx — Maximum
Mn — Minimum



cr	REE SPACE ACTIVIT	v .	DEV	P= 1	SUBSYSTEM NOMENCLATURE					
	AS DATA SHEET (Co		LEVEL DEV	5	RAILS					
	2									
VIS\BI Interval		•		NOTE	s ·					
THIGLAST	Rating	<u>.</u> .			,					
	2-Obstructed	(1) Based on S	KYLAB 60	ft.	umbilical limitation.					
Vo1	tes	(2) 60 feet of	dual, a	lumin	imum, Gemini handrails.					
DEPLOYED	VOLUME	DEVIETODED DV X	(AMTOMAT	A EDOM	AUMTOC AND CDAGO					
Interval	Rating	DEVELOPED BY NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.								
995 in <sup>3</sup> (E)	1-Small				ATION BRANCH, ASTRONAUTICS FLIGHT CENTER, HUNTSVILLE,					
Not	tes	ALABAMA)								
TRANSPORT	VELOCITY									
Interval	Rating									
Not	l tes									
	/A									
CARGO MAS	S LIMIT									
Interval	Rating 1									
_										
Not										
. N,	/A									
CARGO STAB	ILIZATION									
Interval	Rating									
	tes									
	/A •									
CARCO Interval										
Interval.	Rating									
	tes									
Į.	/A									
NORKSITI: STABI										
Interval	Rating									
. Not	tes	1								
М,	/A									
WORKSITE STABIL	LITY (ROTATION)									
Interval	Rating	Reference Bib			19, 27, 29, 52, 57, 61, 63, 71, 78, 79, 80, 87, 94, 96					
	-		30	, 55,	,					
R .	tes	}								
N,	/A		e e e e e e e e e e e e e e e e e e e		REV-					
•	LEGEND:	P - Published Data		Typical						
		E - Estimate		Maximum Minimum						



_	DEF COACE ACTIVE			ÇM.	SUBSYSTEM NO	MENCLATURE		
	REĘ SPACE ACTIVI YSTEMS DATA SHE	ET	DEV LEVEL	5	HAND HELD MANE (HHMU)	EUVERING UNIT		
OPERATIONAL	LIFETIME	EMERGENCY PI	ROVISIONS		ACTUATION FORCE (NORMAL)			
Interval	Rating	Interval <sub>.</sub>	Rating		Interval	Rating		
	2-Short term		3-Extr	a				
No	tes	Not Tether backup	es	i i	otes /A			
ON-SITE TI	ME LIMIT	MASS	3	ACTUATION FOR	CE (ROTATION)			
Interval	Rating	Interval	Rating		Interval	Rating		
	3-Limited, Short term		1-Ligh	t		-		
No	tes	Not	es			otes N/A		
WORKSITE FL	EXIBILITY	MAINTENANCE TIME	E REQUIREMEN	TS	WORKSITE MASS	HANDLING LIMIT		
Interval	Rating	Interval	Rating		Interval	Ra+ ing		
	1-Unlimited		Unknow	n		3-Light		
- No	tes	Not	es		N .	otes		
RAN	Œ	STOWED V	VOLUME		WORKSITE SIZE HANDLING LIMIT			
Interval	Rating	Interval	Rating		Interval	Rating		
50 ft*	3-Close Prox.		1-Smal	1				
	tes	Not	es		otes			
*Limited by t		<u> </u>	······································		N/A ACTUATOR POSITION ACCURACY			
ENVIRONMENTAL Interval		AVERAGE TRANSLAT		Y		1		
Interval	Rating	Interval	Rating		Interval	Raring		
Not	2-Limited	84 ft/sec (P) Not	2-Mediu	m 	Notes			
Same astronau	•	Noc	co		Notes . N/A			
DEPENDA	BILITY	TRANSLATION RA	TE CONTROL		ACTUATOR ORIENTATION ACCURACY			
Interval	Rating	Interval	Rating		Interval	Rating		
	2-Redundancy Reg'd.	·	Unknow	'n		,		
Not		Not	es	-	1	otes N/A		
CREW REQU	IREMENTS	TRANSLATION	STABILITY		WORKSITE RE	ACH ENVELOPE		
Interval	Rating	Interval	Rating		Interval	Rating		
2			Unknow	'n				
Not 1 primary 1 back (tether	-	Not	es		i	otes N/A		
EXPENDABLE R		TRANSLATION MA	NEUVERA BILIT	Y	CARGO TRAN	SPORT_RANCE		
Interval	Rating	Interval	Rating		Interval	Rating		
10 lbs (E)	3-High		Unknow	1				
	tes	Not	es,	Notes . N/A				

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



	DEE SPACE ACTIONS	· · · · · · · · · · · · · · · · · · ·		-	SUBSYSTEM NOMENCLATURE
	REE SPACE ACTIVIT' MS DATA SHEET (Co		LEVEL	5	HAND HELD MANEUVERING UNIT (HHMU)
VISABI	LITY	· · · · · · · · · · · · · · · · · · ·			
Interval	Rating				
	1-Unobstruct.				
No	tes				
DEPLOYED	VOLUME				
Interval	Rating				
	1-Small				
No	tes				
TRANSPORT	VELOCITY				
Interval	Rating				
Not	tes				
	/A				
CARGO MAS	<del> </del>				
Interval	Rating				
Not N	tes /A				
CARCO STAB					
Interval	Rating				;
Not	es				
N,	/A				
CARGO	SIZE				
Interval	Rating				
					-
Not					
	/A				
WORKSITE STABI	LITY (NORMAL) Rating				;
Incervat	RACING				
Not	es				
N/I	I.				
WORKSITE STABIL					
Interval	Rating				-
Not			,		
N,	/A	Reference:	Bib. No. 6	3	REV-

IEGEND: P - Published Data T - Typical E - Estimate Mx - Maximum Mn - Minimum



F	REE SPACE ACTIVIT	rv	DEV.			SUBSYSTEM NOMENCLATURE		
	EŢ	LEVEL L	+	ASTRONAUT MANE (AMU)	UVERING UNIT			
· OPERATIONAL	LIFETIME	. EMERGENCY PROVISIONS			· ACTUATION FOR	ACTUATION FORCE (NORMAL)		
Interval	Rating	Interval	Rating		Interval	Rat ing		
	2-Short term	<del></del>	3-Extra					
No 1	tes	Not Likely to be us tether/umbilica	ces sed with		1	otes N/A		
ON-SITE TI	ME LIMIT	MS	S		ACTUATION FOR	CE (ROTVITON)		
Interval	Rating	Interval	Rating		Interval	Rature		
1 hr (P)	3-Limited Short term	168.3 lbs(P)	l-bight					
Not	tes	· Not	es		No	tes		
6 one-hr. dura	tion missions	137 lbs empty			1	N/A		
WORKSITE FL	EXIBILITY	MAINTENANCE TIM	E REQUIREMENTS		WORKSITE MASS	HANDLING LIMIT		
Interval	Rating	Interval .	Rating		Interval	Rating		
	l-Unlimited		Unknown			,		
Not	es	Not	es		No	tes		
				N/A				
RAN	GE	STOWED	VOLUME	-	WORKSITE SIZE	HANDLING LIMIT		
Interval	Rating	Interval	Rating		Interval	Rating		
2000 ft (P)	2-Limited, Med.	15K sg in(E) 1-Small						
	Notes Gemini use 125 ft. radius		es in. w x 17 i	in.		tes N/A		
ENVIRONMENTAL		deep (P)  AVERAGE TRANSLA	PTON VELOCITY	ACTUATOR POSI	<u> </u>			
Interval	Rating	Interval	Rating		Interval	Rating		
	2-Limited*		2-Medium					
Not		Notes		Notes				
to environment	of astronaut	noces			N/A			
DEPENDA	BILITY	TRANSLATION RATE CONTROL			ACTUATOR ORIENTATION ACCURACY			
Interval	Rating	Intérval	Rating		Interval	Rating		
·	2-redundancy reg'd	.4 fps <sup>2</sup>	2-Medium			,		
Not		Not	es			Notes N/A		
CREW REQU	IREMENTS	TR\NSLATION	STABILITY		WORKSITE RE	ACH ENVELOPE		
Interval	Rating	Interval	Rating		Interval	Rating		
1.		1-Stable						
Notes 2, if tether/umbilical is required.		Notes attitude <sup>±</sup> 2.4 deg. deadhand, automatic 3 axis att. cont.			.1	Notes N/A		
EXPENDABLE R	EQUIREMENTS	TRANSLATION MANEUVERABILITY			CARGO TRAN	SPORT_RANCE		
Interval	Rating	Interval Rating		Interval	Rating			
31 lbs (P)	3-High	1-High						
Not	es	18 <sup>0</sup> /sec pitch 27 <sup>0</sup> /sec roll	es & yaw,		i	tes ' /A		

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



F	REE SPACE ACTIVIT				SUBSYSTEM NOMENCLATURE.
	AS DATA SHEET (Co		LEVEL LEVEL	4	ASTRONAUT MANEUVERING UNIT (AMU)
VISABI	LITY		· · · · · · · · · · · · · · · · · · ·		T
Interval	Rating	<ul> <li>SYSTEM DEVELOPE AEROSPACE CORP.</li> </ul>		, AST	RONAUTICS DIVISION, LTV
	l-Unobstruct.	TERODIACE CORF.			
Not	tes				
DI-PLOYED	VOLUME				
Interval	Rating'				
15K sg in(E)	1-small				
Not 35 in h x 35 i deep.	es nwx17 in				
<ul> <li>TRANSPORT</li> </ul>	VELOCITY				
Interval	Rating				
					ļ
Vot					
N/					
CIRGO MISS					i
Interval	Rating				
No.					ļ
Not N/					•
CARGO STABI	<u>·</u>				
Interval	Rating				
	,				
Not	es l				
N/	A				
CARGO S	SIZE				
Interval	Rating				
Not	*				
N/					
WORKSITE STABIL					The state of the s
THICELAST	Rating	•			
Note	0.0				
N/i	İ	Reference: Bil			, 18, 20, 33,
		34,	, 62, & 9	1	
WORKSITE STABILI - Interval	TY (ROTATION) Rating				Final Report on
-110011123	Bitsonia				lification Test of llar Coverall and
Note	es	Upper Forward	Nozzle	Exter	nsion, LTV Astronau⊢
N/1		tics Division	n Report	No. 3	335.52, Oct. 1965. REV-
	LEGEND: I	Published Data	T - T)	rpical	
	I I		Mx - Ma	ximum	i e
			Mn - Mi		



,	EDEE COACE ACTIVITIES		T		SUBSYSTEM NO	MENCLATURE		
3	FREE SPACE ACTIVI SYSTEMS DATA SHE				AUTOMATIC STA	AUTOMATIC STABILIZATION MANEUVERING UNIT (ASMU)		
OPERATIONAI	LIFETIME	EHERGENCY PROVISIONS			ACTUATION FO	ACTUATION FORCE (NORMAL)		
Interval -	Rating	Interval	Rating		Interval	Rating		
	Unknown		l-None red	g'd				
. No	. Notes		tes		V	otes		
		(1)		<u> </u>	·	n/a		
	ON-SITE TIME LIMIT		S		ACTUATION FOR	CE (ROTVILOV)		
Interval	Rating	Interval Rating		Interval	Rating			
	3-Limited Short term	l-Light						
No	tes	No	tes		N	otes		
- 1						n/A		
WORKSITE FI	EXIBILITY	MAINTENANCE TIM	E REQUIREMENT	rs	WORKSITE MASS	HANDLING LIMIT		
Interval	Rating	Interval	Rating		Interval	Rating .		
	,		Unknow	n	İ			
No	tes	Notes			N	Notes		
N	N/A			n/a				
RAN	Œ	STOWED	VOLUME		WORKSITE SIZE	HANDLING LIMIT		
Interval	Rating	Interval	Rating		Interval	Rating		
	3-Close prox.	· 1-Small		İ	·			
Not Limited by len workshop (1)	tes gth of SKYLAB	Notes				otes N/A		
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSI	TION ACCURACY			
Interval	Rating	Interval	Rating		Interval	Rating -		
·	2-Limited	<b></b> ′	2-Medium	n				
	tes	Not	tes	•		otes		
(1)	DT LTON	WALL CLASS OF	LOTE GOVERNOT		N/A ACTUATOR ORIENTATION ACCURACY			
DEPENDA Interval	Ratang	TRANSLATION R Interval			Interval	<del></del>		
ZHOCI VAL		.46 ft/sec <sup>2</sup>	Rating		Interval	Rating		
	Unknown	(P)	2-Mediu	ım				
Not	tes	No1	tes		1	Notes N/A		
CREW REQU	IREMENTS	TRANSLATION	STABILITY	• • • •	WORKSITE RE	ACH ENVELOPE		
Interval	Rating	Interval	Rating		Interval	Rating		
1			2-Mod. Sta	ab.	,			
Not	es	Not	es	;	. No	otes		
		•			И	/A		
EXPENDABLE R	EQUIREMENTS	TRANSLATION MANEUVERABIL			· CARGO TRAN	SPORT RANGE		
Interval	Rating	Interval			'Interval	Rating		
	Unknown		2-Medium	n	.			
Not	es	Not	es		4	otes		
					, N	/A		

T - Typical Mx - Maximum Mn - Minimum LEGEND: P - Published Data E - Estimate



FREE SPACE ACTIVITY			DEV	9	SUBSYSTEM NOMENCLATURE	
1	AS DATA SHEET (C			LEVEL	3	AUTOMATIC STABILIZATION MANEUVERING UNIT (ASMU)
VISABI	LITY	A 44 AV	A CONTRACTOR		***	
Interval	Rating	1			NOTE	s ´
	1-Unobstruct.	(1)	ASMU to be	SKYLAB M-509 experiment		
No	<del></del>	1	(to be con	nducted i	nside	OWS); no life support .
Limited to OWS			capabilit	y include	đ.	•
DEPLOYED		1				•
' Interval	Rating	1				
	1-Small	1				•
No1	- AS	1				
TRANSPORT	VELOCITY	1				
Interval	Rating	1				
		}				
Not	tes	1				
	· N/A					
CARGO MAS	S LIMIT -	]				
Interval	Rating	1				
		1				
Not		1				
N,	/A					
CARGO STAB	ILIZATION	]				
Interval	Rating	_				
,						
- Not	es	]				
N/	/A	ļ				
- CARGO	SIZE	1				
Interval .	Rating	1				
	_					
Not	•	]				
N/	'A					
WORKSITE STABI						
Interval	Rating	1				
	Ünknown	]				,
Not	es					
£		]				
WORKSITE STABIL	ITY (ROTATION)	]				
Interval	Rating					
	Unknown	1				
Not	tes ·	1		•		•
		Refe	rence: B	ib. No. 6	8	REV-
	LEGEND:		lished Data imate	T - T Mx - } Mn - }		n



	REE SPACE ACTIVIT	######################################			SUBSYSTEM NO	MENCLATURE	
	SYSTEMS DATA SHE		LEVEL DEV	3	TROLLEY		
OPERATIONAL	LIFETIME	EMERGENCY P	ROVISIONS		ACTUATION FOR	CE (NORMAL)	
Interval	Rating	Interval	Rating		Interval	Rating	
	2-Short term		l-None Req.			,	
No	tes	. No	tes	,	.\o	tes A	
ON-SITE TI	ME LIMIT	MAS	S		ACTUATION FOR	E (ROTATION)	
[nterval	Rating	Interval	Rating		Interval	Rating	
	1-Unlimited		2-Modera	ate			
No -	tes	No	tes		No N/	tes A	
`` · WORKSITE FL	EXIBILITY	MAINTHNANCE TIM	E REQUIREMEN	TS	WORKSITE MASS	ANDLING LIMIT	
Interval	Rating	Interval	Rating		Interval	Rating	
•	, r		Unknown	•			
Notes N/A		No.	tes		votes N/A		
RAN	Œ	STOWED VOLUME		WORKSITE SIZE	HANDLING LIMIT.		
Interval	Rating	Interval	Rating		Interval	Rating	
60 ft.		1-Small		. <u>·</u>			
	tes 1)	No	tes	I.	tes - /A		
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCIT	ACTUATOR POSI	TION ACCURACY		
Interval	Rating	Interval	Rating		Interval	Rating	
	l-Unlimited		3-Slow				
No <sup>-</sup>	tes	Notes .			Notes N/A		
DEPENDA	BILITY	TRANSLATION F	ATE CONTROL		ACTUATOR ORIEN	PATION ACCURACY	
Interval	Rating	Interval	Rating		Interval .	Rating	
	2-Redund. Reg.		`l-High		•		
No	tes	No	tes		4	tes I/A	
CREW REQU	TREMENTS	TRANSLATION	STABILITY		WORKSITE RE	ACH ENVELOPE	
[nterval	Rating	Interval	Interval Rating		Interval	Rating	
2 Crewman		l-Stable					
Notes (2)		No	tes		2	tes /A	
EXPENDABLE F	EQUIREMENTS	TRANSLATION MANEUVERABILITY			CARGO TRAN	SPORT-RANGE	
Interval	Rating	Interval	Rating		Interval	Rating	
	2-Medium		3-Low				
No	tes	Notes				tes /A	

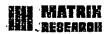
LEGEND: P - Published Data T - Typical E - Estimate Mx - Maximum Mn - Minimum



·	<u> </u>	1 1 1 1	<u> </u>				213 × 105 × 20 ×			- 1
, E	REE SPACE ACTIVIT	Y		DEV	<i>6</i> %	SU	BSYSTEM	NOMENC	ATUR	E
	//S DATA SHEET (Co			EVEL	3		TROLLEY	•		i
VISABI	LITY	THE REPORT OF STREET		or the constant of		Open wilder van	A'	to the specific section of		
Interval	Rating			3	NOTES					
	1-Unobstructed	(1) Astro	onaut w	ith w	mbili	cal				
Not	tes	•			•			er or um		
. DEPLOYED	VOLUME	MANUFACTURED LABORATOR	BY MA	RSHALI	L SPA	CE FLI	GHT CEN	TER, AS	RONA	TICS
Interval	Rating		KIES, H	OMISAI	rnne,	ALABA	MA.			
	l-Small						•			
Not	es									
TRANSPORT	VELOCITY	•								
Interval	Rating									
Not N/	B									
CARGO MASS	SLIMIT									
Interval	Rating									
Not										
N/										
CARGO STABI										- 1
Interval	Rating									
Not	es									
N/										
CARGO S	SIZE									
Interval	Rating									
Not	1									
N/										
NORKSITE STABII Interval		•								
Interval	Rating									
Note	es									ý ,
N/										
WORKSITE STABILI	TY (ROTATION)									
Interval	Rating			•						
		Postovenska na	h 17-	0 11		22	00 50			
Not	ŀ	Reference Bi	<b>р. МЭ.</b>	78, 13	79, 80	, 27, : 0, 96	29, 30,	57, 63,	68,	71,
N/	A	hill grand standardings and still	w with a water	e see and the				RE	у -	

IEGEND: P = Published Data
'E = Estimate

T - Typical Mx - Maximum Mn - Minimum



<u> </u>				SUBSYSTEM NO	MENCLATURE
s	REE SPACE ACTIVIT SYSTEMS DATA SHEI	ÉT	DEV Z	SERVO POWERED	HARDSUIT
OPERATIONAL		EMERCENCY P	ROVISIONS	ACTUATION FORCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Ra vine
	Unknown	<del></del> .	3-Extra		l-High
No <sup>-</sup>	tes	Not	tes	No	otes [
ON-SITE TI	ME LIMIT	MAS	S	ACTUATION- FOR	CE (ROTALION)
Interval	Rating	Interval Rating		Interval	Rating
	Unknown	2-Moderate			1-High
No	tes	Not	es	'No	otes
WORKSITE FL	EXIBILITY	MAINTENANCE TIM	E REQUIREMENTS	WORKSITE MASS	HANDDING TURNET
Interval	Rating	Interval	Rating	Interval	Rating (
	Unknown		Unknown		'Unknown
No:	tes	Not •	es	Notes	
RAN	RANGE		VOLUME	WORKSITE SIZE	HANDLING LIVIT
Interval	Rating	Interval	Rating	Interval	Rating
	3-Close Prox.		2-Moderate		Unknown
Not	tes	Not	es	No	otes '
ENVIRONMENTAL	FLEXIBILITY	AVERACE TRANSLA	TION VELOCITY	ACTUATOR POSI	TION ACCURACY
Interval .	Rating	Interval	Rating	Interval	Rating 1
	2-Limited		3-Slow		İ
Not Superior to E		Not	es		otes V/A
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating
	2-Redundancy Reg'd		Unknown		,
No1	tes	Not	es		otes N/A
CREW REQU	TREMENTS	TRANSLATION	STABILITY ,	WORKSITE RE	ACH ENVELOPE
Interval	Rating	Interval	Rating	Interval	Rating '
2			Unknown		' Unknown
	tes backup ical managemt.)	Not	es	No	etes, r
EXPENDABLE R	EQUIREMENTS	TRANSLATION MANEUVERABILITY		CARCO TRAN	SPORT RANGE
Interval	Rating	Interval	Rating	Interval	Rating
	Unknown		Unknown		Unknown
Not	tes	Not	es	No	otes -

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



				<b>n</b>	SUBSYSTEM NOMENCLATURE
	EE ŜPACE ACTIVITY S DATA SHEET (Coi		LEVEL DEV	2	SERVO POWERED HARDSUIT
	DATA GILLI (60)				
VISABIL		•			1
Interval	Rating				
	Unknown				Ì
Not	es				
DEPLOYED					1
Interval	Rating	•			
Not Not					
TRANSPORT N					
Interval	Rating				
	Unknown				
Not					
CARGO MASS	S LIMIT				
Interval	Rating				
~~	Unknown				
Not	es				
		1			
CARCO STAB					
. Interval	Rating	}			
	Unknown				
Not	tes				ļ
04.00	0775	ļ			
CARGO Interval	Rating	1			
	Unknown				
No.	tes				•
	,				•
WORKSITE STABI	LITY (NORMAL)	]			
Interval	Rating	]			
·	Unknown				
No	tes				
WORKSITE STABIL	LITY (ROTATION)				
Interval	Rating	4			
		4			
	ites i/A	Reference:	Bib. No.	68	REV-
1	/A				
	LEGEND:	P - Published Dat E - Estimate	Мх -	. Туріс Махи	num ·
•			Mn -	. Mini	num
					1



	REE SPACE ACTIVI	TV		SUBSYSTEM NO	MENCLATURE	
	YSTEMS DATA SHE	ET	DEV LEVEL 5	UNAIDED A	STRONAUT	
OPERATIONAL		EMERGENCY P	ROVISIONS	ACTUATION FO	RCE (NORMAL)	
Interval	Rating	Interval	Rating	Interva l	Rating	
	1-Unlimited	3-Extras				
No: (1)	tes	Not (8)	tes	'\otes (11)		
	ON-SITE TIME LIMIT		S	ACTUATION FOR	CE (ROTVITON)	
Interval	Rating	Interval	Rating	· Interval	Rating	
	3-Short term	296 lbs (T, E)	2-Moderate	·		
No:	tes	` (9)	tes	(11)	otes	
WORKSITE FL	EXTRILITY	MAINTENANCE TIM	E REQUIREMENTS	<del></del>	HANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
	3-Prepared W/S only	50% (E)				
Not	tes	Not	<del></del>	Notes (11)		
RAN	RANGE		VOLIME .	WORKSTTE SIZE	HANDLING LIMIT -	
Interval	Rating	Interval	<del></del>		Rating .	
60 feet	3 Close Prox.	22.5K in <sup>3</sup> (T,E) 2 Moderate				
Not (4)	ces	Not	tes	` N	otes .	
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSI	TION ACCURACY	
- Interval	Rating	Interval	Rating	Interval	Rating	
	2-Limited_					
Not (5)	ces	Not N	tes /A	Notes (11)		
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
	l-No Redund.					
Not	tes	Not N/		Notes . (11)		
CREW REQU	IREMENTS	TRANSLATION	****		ACH ENVELOPE	
Interval	Rating	Interva]	Rating	Interval	Rating	
2 Crewmen						
Not	ces	Not	es	,Ne	otes	
(6)		N/	'A `	(11)		
EXPENDABLE R	EQUIREMENTS	TRANSLATION MANEUVERABILITY		CARGO TRAN	SPORT RANGE	
Interval	Rating	Interval	Rating	Interval	Rating	
	2-Medium	,				
Not (7)	tes	Not N/		N	otes '	

LEGEND: P - Published Data E - Estimate

T - Typical Mx - Maximum Mn - Minimum



FE	EE SPACE ACTIVIT	Υ				SUBSYSTEM NOMENCLATURE				
R	IS DATA SHEET (Co		-	LEVEL DEV	5	UNAIDED ASTRONAUT				
VISABI	LITY		* ***	***************************************		•				
Interval	Rating				ron	res				
		(1)	Unlimited	for proj	ected	l mission durations.				
Not	es	(2)	SKYLAB EVA	time co	netra	vínta				
N/i	A	(2)								
DEPLOYED	VOLUME	(3)	Translatio	on, stabi	lizat	ion, and transportation				
Interval	Rating		emergency			ed as well as lighting and				
22.5K in <sup>3</sup> (T,E)	2-Medium	(4)	CVVI ND	sil.anl 3	- 					
Not	es	(4)	(5) No EVA under high electromagnetic radiation or hig							
		(5)								
TRANSPORT V	· · · · · · · · · · · · · · · · · · ·		meteorite density.							
Interval	Rating	(6)	Primary ar	nd suppor	t/eme	rgency backup EVA astronauts.				
		(7)	O2, LiOH,	HaO.						
Not	Notes					•				
N/7	1	(8)	Backup ast	ronaut, 1	backu	p life support, life tether.				
CARCO MASS	LIMIT	(9)	Includes E	EVA astronaut, pressure suit, ITMG,						
Interval	Rating		typical li	fe suppo	rt sy	stem weights.				
		(10)	Eating, sl	eeping,	etc.					
Note	es	(11)								
N/A	<u> </u>	(11)	Recorded i	or each	STADI	lization subsystem.				
CARGO STABI	LIZATION									
Interval	Rating	-								
Note										
N/A	·									
CARGO S	IZE									
Interval	Rating									
Note										
N/A										
WORKSITE STABIL						a de la companya de la companya de la companya de la companya de la companya de la companya de la companya de				
Interval	Rating									
Note	s									
N/A	·					i				
WORKSITE STABILI	TY (ROTATION)									
Interval	Rating	Ref	erence Bib.	No. 1,	8, 13	, 19, 27, 29, 48, 50, 52, 57,				
				61,	63,	68, 71, 75, 78, 83, 84, 87,				
Note	i			94,	30	,				
N/A			*****			REV-				
			olished Data timate	T - Ty Mx - Ma Mn - M:						



	EDEE COACE ACTIVE			SUBSYSTEM NOMENCLATURE HANDRAILS/HANDHOLDS		
•	SYSTEMS DATA SHE	•	DEV LEVEL 5			
OPERATIONA	L LIFETIME	EMERCENCY P	ROVISIONS	ACTUATION FORCE (NORMAL)		
Interval	Rating	Interval	Rating	Interval	Rating	
	1-Unlimited		l-None Reg'd.	43 lbs (P, T)	2-Moderate	
N .	otes	Not		No	tes	
ON-SITE I	IME LIMIT	MAS	S	ACTUATION FUR	E (ROTATION)	
Interval	Rating	Interval ·	Rating	Interval	Rating	
	1-Unlimited	.8 lbs (E) l-Light			2-Moderate	
N	otes	Not	ces	No	ites	
WORKSITE F	LEXIBILITY	MAINTENANCE TIM	E REQUIREMENTS	WORKSITE MASS	HANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
	3-Prepared W/S		1-None	<118 lbs(E)	3-Light	
N	otes	Not .	ces	Notes		
RANGE		STOWED	VOLUME	WORKSITE SIZE	HANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
		8.3 in <sup>3</sup> (E) 1-Small		<4K in <sup>3</sup> (E)	3-Small	
	otes N/A	Not	es	No	tes .	
ENVIRONMENTA	L FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSI	TION ACCURACY	
Interval `	Rating	Interval	Rating	Interval	Rating	
	1-Unlimited		-		l-Accurate	
- N	otes	Not N	es /A	No	tes	
DEPENI	ABILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
	1-No Redund.				1-Accurate	
N	otes	Not N	es /A	Notes		
CREW REC	QUIREMENTS	TRANSLATION	STABILITY	WORKSITE RE	ACH ENVELOPE ,	
Interval	Rating	Interval	Rating	Interval	Rating	
				FM = 218	1-Small	
	otes N/A	Not N	ces /A	Ио	tes	
EXPENDABLE REQUIREMENTS		TRANSLATION MA	NEUVERABILITY_	CARGO TRAN	SPORT RANGE	
Interval	Rating	Interval	Rating	Interval	Rating	
	1-Low					
N	otes .	Not N	ces /A		ites ' N/A	

LECEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



FREE SPACE ACTIVITY			OEV		SUBSYSTEM NOMENCLATURE			
ž ,	IS DATA SHEET (Co	N N	TEAET	5	HANDRAILS/ HANDHOLDS			
VISABI	LITY			_				
Interval	Rating	NOTES						
	2-Obstruct.	(1) Assume handhold/rail one foot long in Gemini						
		configurat						
100	tes ,	(2) Pull force, impulse.						
DEPLOYED	VOLUME	(2) rail torce, impurse.						
· Interval	Rating	DEVBLOPED BY NATIONAL AERONAUTICS AND SPACE						
8.3 in <sup>3</sup>	1-Small	ADMINISTRATION . (CONTACT MAN/SYSTEMS INTEGRATION BRANCH, ASTRONAUTICS						
Not	L	MARSHALL SPACE	FLIGHT (	CENTE	R, HUNTSVILLE, ALABAMA			
(1)	.03				l			
TRANSPORT	VELOCITY							
Interval	Rating							
,								
Not	es							
N/								
CIRCO MIS	S LIMIT	]						
Interval	Rating	]						
,		<u> </u>						
Not	ces	1						
N	/A							
CARGO STAB	ILIZATION	]						
Interval	Rating	1						
Not		]						
N/	/A	į						
CARGO	SIZE	]						
Interval	Rating	ļ						
Not		ĺ						
И	<del></del>	1						
WORKSITE STABI		]						
Interval	Rating	4						
	1-Stable							
Notes								
		]						
WORKSITE STABIL	ITY (ROTATION)	_						
Interval	Rating	Reference Bib	. No. 8,	13, 68	19, 25, 27, 29, 52, 57, 61, 69, 71, 75, 78, 79, 80, 94,			
<u></u>	1-Stable	96						
No:	Notes				` REV-			
				·				
	LEGEND:	P - Published Data E - Estimate		Typica: Maxımu				
		D - Potruge		Minimu				



F	DEV		SUBSYSTEM NOMENCLATURE				
FREE SPACE ACTIVITY SYSTEMS DATA SHEET			DEV LEVEL	"	DUTCH	I SHOES	
OPERATIONAL LIFETIME		EMERGENCY PI	OVISIONS		ACTUATION FORCE (NORMAL)		
Interval	Rating	Interval	Rating		Interval	Rating	
	l-Unlimited		1-None Reg	đ.	48 lbs(T, Mx)	2-Moderate	
Not	Notes		Notes .		Notes (2)		
ON-SITE TIM	E LIMIT	MA SS		ACTUATION FORCE (ROTVIEW)			
Interval	Rating	Interval	Rating		Interval	Rating	
	lUnlimited	121 lbs (E)	l-Light		~- <u>-</u>	2-Moderate	
. Not	es	Not (3)	es		No	ites	
WORKSITE FL	EXIBILITY	MAINTH NANCE TIME	E REQUIREMENTS		WORKSITE MASS HANDLING LIMIT		
Interval	Rating	Interval	Rating		Interval	-Rat tog	
	8-Prepared W/S		1-None		>235 lbs (P)	2-Moderate	
Yot	es	Notes -		Notes			
RANG	Œ	STOWED	OLIME		WORKSITE SIZE HANDLING LIMI		
Interval	Rating	Interval	Rating		Interval	Ratine	
		1.2K in <sup>3</sup> (E)	1-Small		12K in <sup>3</sup> (P)	2-Moderate	
1	Notes N/A		Notes		Notes		
ENVIRONMENTAL	ENVIRONMENTAL FLEXIBILITY		AVERAGE TRANSLATION VELOCITY		ACTUATOR POSI	TION ACCURACY	
Interval	Rating	Interval	Rating		Interval	Rating	
	1-Unlimited					1-Accurate	
Not	Notes		· Notes · N/A		Notes		
DEPENDAT	BILITY	TRANSLATION RATE CONTROL		ACTUATOR ORIENTATION ACCURACY			
Interval	Rating	Interval	Rating		Interval	Rating	
	l-No Redund.					1-Accurate	
Not	Notes		Notes N/A		Notes		
, CREW REQUI	, CREW REQUIREMENTS		TRANSLATION STABILITY		WORKSITE REACH ENVELOPE		
[nterval	Rating	Interval	Rating		Interval	Rating	
2 Crewmen					FM = 268	2-Medium	
Not (1)	Notes		Notes N/A		Notes		
EXPENDABLE RI	EXPENDABLE REQUIREMENTS		TRANSLATION MANEUVERABILITY		CARGO TRAN	SPORT RANGL	
Interval	Rating	Interval	Rating		Interval	Rating	
	1-Low			_	;	<u> </u>	
Not	Notes		Notes N/A		Notes N/A		

LEGEND: P - Published Data
E - Estimate

T - Typical Mx - Maximum Mn - Minimum



FREE SPACE ACTIVITY SYSTEMS DATA SHEET (Continued)				DEV LEVEL	-	SUBSYSTEM NOMENCLATURE			
			2		5	טט	тсн ѕное	s	
VISABI	LITY			- * **					
Interval	Rating			•	NOTE	s	•		
	1-Unobstruct.	(1) Pr	imary an	d suppor	t ast	ronauts.			
Not	tes	(2) Pull force, impulse.							
DEPLOYED VOLUME		(3) Shoes and support structure.							
Interval	Rating	~						· .	
1.2K in <sup>3</sup> (E)	1-Small	DEVELOPED BY NASA MANNED SPACECRAFT CENTER,							
Not	es		ON, TEXAS			,	,		
TRANSPORT '	VELOCITY								
Interval	Rating								
· Not									
N/									
CARGO MASS									
Interval	Rating								
Not	00								
N/									
CARGO STABI									
Interval	Rating								
Not	es								
N/	A								
CARGO S	SIZE								
Interval	Rating								
								•	
Note N/	' I								
WORKSITE STABIL									
Interval	Rating								
	l-Stable								
Note	es								
WORKSITE STABILI	TY (ROTATION)							i	
Interval	Rating								
	l-Stable	Refer	ence Bib			19, 27, 29, 94, 96	52, 57,	68, 71,	
Notes			,			•			
		<u>-</u>	515 W. T.					REV-	
		P - Publish E - Estimat		T — Ty Mx — Ma Mn — Mi		,		•	

5-1-9 (b)



FREE SPACE ACTIVITY				SUBSYSTEM NOMENCLATURE		
SYSTEMS DATA SHEET			DEV LEVEL 5	HANDRAIL & FO	OT RESTRAINT	
OPERATIONAL LIFETIME		EHERGENCY PROVISIONS		ACTUATION FORCE (NORMAL)		
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited		l-None Regid.	62 lbs (P)	2-Moderate	
No	tes	No	tes	Notes		
ON-SITE TI	ME LIMIT .	MAS	S	ACTUATION FORCE (ROTATION)		
Interval .	Rating	Interval	Rating	Interval	Rating	
	1-Unlimited	13 lbs (E)	l-Light		2-Moderate	
No.	tes	No: (3)	tes	No	tes	
WORKSITE FL		MAINTFNANCE TIM	E REQUIREMENTS	WORKSITE MASS I	ANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
	3-Prepared W/S		l-None	>235 lbs(P)	2-Moderate	
Not	tes	. Not	tes	Notes -		
RAN	GE ·	STOWED VOLUME		WORKSITE SIZE 1	ANDLING LIVET	
Interval	Rating	Interval	Rating	Interval	Rating	
		1.2K in <sup>3</sup> (E)	l-Small	> 12K in <sup>3</sup>	2-Moderate	
Notes		Not	tes .	No	tes `	
N/		(3)		Admit Mon. no. 22	NYON A SOUTH ON	
Interval	ENVIRONMENTAL FLEXIBILITY		TION VELOCITY	ACTUATOR POSIT		
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited				1-Accurate	
NO1	tes	Not N,		Notes		
DEPENDA BILITY		TRANSLATION RATE CONTROL		ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
	l-No Redund.				l-Accurate	
Notes		Not N	tes /A	Notes		
CREW REQUIREMENTS		TRANSLATION STABILITY		WORKSITE REACH ENVELOPE		
Interval	Rating	Interval	Rating	Interval	Rating	
2 Crewmen				FM=268	2-Medium	
Notes (2)		Notes N/A		Notes ,		
EXPENDABLE REQUIREMENTS		TRANSLATION MANEUVERABILITY		CARGO TRANSPORT RANGE		
Interval	Rating	Interval Rating		İnterval ·	Rating	
	l-Low				<u> </u>	
Notes		Notes N/A		Notes N/A		

LECEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



SUBSYSTEM NOMENCLATURE FREE SPACE ACTIVITY · DEV " SYSTEMS DATA SHEET (Continued) LEVEL HANDRAIL & FOOT RESTRAINT VISABILITY NOTES Interval Rating . ---1-Unobstruct. (1) Impulse - push direction. (2) Primary and support. (3) Assumes Dutch Shoes and I foot of aluminum Gemini DEPLOYED VOLUME handrail. **Interval** Rating MANUFACTURED BY NATIONAL AERONAUTICS AND SPACE ADMIN-1.2K in<sup>3</sup> 1-Small ISTRATION (Contact Man/Systems Integration Branch, Astronautics Laboratory, Marshall Space Flight Center, Notes (3) Huntsville, Alabama) TRANSPORT VELOCITY Interval Rating Notes N/A CARCO MASS LIMIT Interval Rating Notes N/A CARGO STABILIZATION Interval Rating Notes N/A CARGO SIZE Interval Rating Notes N/A WORKSITE STABILITY (NORMAL) Interval Rating 1-Stable Notes WORKSITE STABILITY (ROTATION) Interval Rating 1-Stable Reference: Bib. No. 8, 13, 19, 26, 29, 57, 63, 68, Notes 71, 77, 78, 80, 99, 96. REV-

E - Estimate

Mn - Minimum



FREE SPACE ACTIVITY SYSTEMS DATA SHEET			PEA 3	SUBSYSTEM NOMENCLATURE MAINTENANCE RESTRAINT		
OPERATIONAL LIFETIME		EMERGENCY PROVISTONS		ACTUATION' FO	RCE (NORMAL)	
Interval	Rating	Interval	Rating .	Interval	Ratine	
	l-Unlimited			30 ft 1bs(E)	3-Low	
Notes		Not N/		1	Notes In any principle axis	
on-site ti	ME LIMIT	MA SS	3	ACTUATION FORCE (ROTATION)		
Interval .	Rating	Interval	Rating	Interval	_Rating	
<del></del> ,	l-Unlimited	8 lbs	1-Light	30 ft lbs(T)	3-Low	
No.	tes	Not	es	No	tes	
WORKSITE FL	EXIBILITY	MAINTENANCE TIME	REQUIREMENTS	WORKSITE MASS	HANDLING LINIT	
Interval	Rating	Interval	Rating .	Interval	Rating	
***·-	3-Prep. W/S		1-None		3-Light	
No Requires attac	tes Ch points	Notes		Notes		
RAN	GE	STOWED VOLUME		WORKSITE SIZE HANDLING LIMIT		
Interval	Rating	Interval ,	Rating	Interval	Rating ,	
		6"x6"x20" (E)	1-Small	<u></u>	3-Small	
Notes N/A		Not	es	No	Notes	
ENVIRONMENT\L	ENVIRONMENTAL FLEXIBILITY		AVERAGE TRANSLATION VELOCITY		TION ACCURACY -	
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited					
No	Notes		Notes N/A		Notes · N/A	
, DEBENDA	DTYYMI			ACTUATOR ORIENTATION ACCURACY		
DEPENDA Interval	1	TRANSLATION RATE CONTROL Interval Rating		Interval	Rating	
, —	Rating 1-No redund.	Interval	кастид	Interval	MATTINE	
reg'd Notes		Notes N/A		Notes N/A		
CREW REQUIREMENTS		TRANSLATION STABILITY		WORKSITE REACH ENVELOPE		
Interval	Rating	Interval	Rating	Interval	Rating ·	
1				FM=230 (E)	2-Medium	
Notes		Notes		Notes		
-		N/A				
EXPENDABLE REQUIREMENTS		TRANSLATION -MAI	NEUVERABILITY	CARGO TRAN	SPORT RANGE	
Interval	Rating	Interval	Rating	Interval	Rating	
Notes N/A		Notes N/A		Notes N/A		

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



FREE SPACE ACTIVITY SYSTEMS DATA SHEET (Continued)		DEV LEVEL	•	SUBSYSTEM NOMENCLATURE	
			3	MAINTENANCE RESTRAINT	
. VISABI	LITY	•			
Interval	Rating				
***	1-Unobstruct.				
Not	ces				
DEPLOYED	VOLUME				
Interval .	Rating				
`	2-Medium				
Not	es				
TRANSPORT	VELOCITY				
Interval	Rating				
Not					
N/					
CARGO MASS	<del></del>				
incerval	Rating				
Not	es				
N/					
CARCO STAB					
Interval	Rating				
Not					
N/					_
CARGO S Interval	CARGO SIZE				
interval	Rating				
Not	es				
i e	N/A				
WORKSITE STABI	LITY (NORMAL)				
Interval	Rating				
	2-Mod. Stab.				
Notes					
WORKSITE STABIL	WORKSITE STABILITY (ROTATION)				
Interval	Rating				
30 ft lbs(T)	2-Mod. Stab.	References: E	ib. No.	27 °& 2	29
Not	es	Martin Marri System Devel	etta Cor opment, l	o. Rej MRC-6	port on <u>Restraint</u> 9-544, NAS8-24840. REV-

IEGEND: P - Published Data T 4. Typical
E - Estimate Mx - Maximum
Mn - Minimum



<u></u>	REE SPACE ACTIVIT			SUBSYSTEM NO	MENCLATURE	
	YSTEMS DATA SHE		DEV 3	VARIABLE FLEXII	BILITY TETHER	
OPERATIONAL	LIFETIME	EMERGENCY P	ROVISIONS	ACTUATION FOR	CF (ZOBAZE)	
Interval	Rating '	Interval	Rating	Interval	Rating	
	2-Short term		2-Integral	46 lbs (P)	2-Moderate	
No:	tes	Not	ces .	(1)	tes	
ON-SITE TI	ME LIMIT	MAS	S	ACTUATION FORCE	T. (ROTVITON)	
Interval	Rating	Interval	Rating	Interval	Retres	
	l-Unlimited	221 lbs (P)	1-Light		2-Moderate	
No.	tes	Not	ces	Vo	tes	
WORNSITE FL	EXIBILITY	MAINTLNANCE TIM	E REQUIREMENTS	WORKSITE MASS 1	ANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
	2-Spec.Interf.		1-None	235 lbs	2-Moderate	
.No.	tes	(7) · Not	es	No	tes	
RAN	GE	STOWED VOLUME		WORKSITE SIZE HAMDLING LIMIT		
Interval	Rating	Interval	Rating	Interval	Ratins	
	3-Close Prox.	1728 in <sup>3</sup> (P)	l-Small	12K in <sup>3</sup>	2-Moderate	
(4)	tes	Not	es	No.	tes	
ENVIRONMENTAL	FLEXIBILITY	AVERACE TRANSLA	TION VELOCITY	ELOCITY ACTUATOR POSITION ACTUA		
Interval	Rating	Interval	Rating	Interval	Ret	
	l-Unlimited				1-Accurate	
No:	tes	Not N,		Notes		
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
	2-Redun. Req.				1-Accurate	
No	tes .	Not N,	ces /A	No	tes	
CREW REQU	IREMENTS -	TRANSLATION	STABILITY	WORKSITE REA	CH ENVELOPE	
Interval	Rating	Interval	Rating	Interval	Rating	
2 men				FM = 720*	l-Large	
Not	tes	Not	es	1	tes	
(5)			/A	*10 ft. radius	sphere(approx)	
EXPENDABLE R	EQUIREMENTS	TRANSLATION MA	NEUVERA BILITY	CARGO TRANS	SPORT RANGE	
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Low					
No	tes	Not N	ces /A		tes I/A	
	بالمساف الهيب بالأناد الأثاب وال	· ·				

LEGEND: P - Published Data E - Estimate



SUBSYSTEM NOMENCLATURE FREE SPACE ACTIVITY DEV LEVEL SYSTEMS DATA SHEET (Continued) VARIABLE FLEXIBILITY TETHER VISABILITY NOTES Interval Rating 1-Unobstruct. (1). Impulse force - pull direction. (2) Appropriate attach point. (3) Possible friction wear, deterioration. DEPLOYED VOLUME Interval Rating (4) Assumes astronaut close proximity limitations. 1728 in<sup>3</sup> (E) 1-Small (5) Primary astronaut with support astronaut tending Notes umbilical and/or tether. (6) Unaided harness doffing. TRANSPORT VELOCITY Interval Rating (7) Probably discarded if damaged. (8) F = 10 lbs for 8 ft, 80 ft.lbs. Notes MANUFACTURED BY GENERAL ELECTRIC, SPACE DIVISION, VALLEY N/A FORGE SPACE CENTER, P.O. BOX 8661, PHILADELPHIA, PENN-CARGO MASS LIMIT SYLVANIA. Interval Rating Notes N/A CARGO STABILIZATION Interval Rating Notes N/A CARGO SIZE Interval Rating Notes N/A WORKSITE STABILITY (NORMAL) Interval Rating FM=17.3 2-Moderate Notes (8) WORKSITE STABILITY (ROTATION) Interval Rating 10 ft-1bs 2-Moderate Reference: Bib. No. 8, 19, 27, 29, 50, 57, 61, Notes 63, 68, 71, 72, 78, 87, 94, 96. REV-LEGEND: P - Published Data T - Typical

E - Estimate

Mx - Maximum

Mn - Minimum



	REE SPACE ACTIVIT			SUBSYSTEM NO	MENCLATURE
. s	SYSTEMS DATA SHEET		DEV 3	, BOOM ATTACH	IMENT
	OPERATIONAL LIFETIME		ROVISIONS	. ACTUATIÓN FOF	RCE (VORMAL)
Interval	Rating	Interval	Rating	Interval	Rating
	2-Short term		Unknown	>45 lbs (E) ⋅	2-Moderate
. No	tes ·	(5)	tes	(1) · %0	rtes
ON-SITE TI	ME LIMIT	MASS		ACTUATION FOR	E (ROTATION)
Interval	Rating	Interval	Rating	Interval	Rating
`	1-Unlimited		l-Light	·	2-Moderate
No:	tes	No:	tes	No	tes
WORKSITE FL	EXIBI LITY	MAINTENANCE TIM	E REQUIREMENTS	WORKSITE MASS I	ANDLING LIMIT
Interval	Rating	Interval	Rating	Interval	Rating
<del></del>	2-Spec. Interf.		l → None	2351bs (E)	2-Moderate
No.	tes	No:	tes	(1)	tes .
RAN	GE	STOWED VOLUME		WORKSITE SIZE I	ANDLING LIMIT
Interval	Rating	Interval	Rating	Interval	Rating
60ft (E)	3-Close Prox.		1-Small		3-Small
No (3)	tes	Notes		No	tes 
ENVIRONMENTAL	FIEXIBILITY	AVERACE TRANSLA	TION VELOCITY	ACTUATOR' POSIT	PTON ACCURACY
Interval	Rating	Interval	Rating	Interval	Rating
	l-Unlimited				1-Accurate
No	tes	Notes N/A		- Notes	
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENT	MATION ACCURACY
Interval	Rating	Interval	Rating	Interval	Raring
	2-Redund. Req.				l-Accurate
No	tes		tes /A·	. No	tes .
CREW REQU	IREMENTS	TR\NSLATION	STABILITY	WORKSITE RE	ACH ENVELOPE
[nterval	Rating	Interval	Rating	Interval	Rating
2 Crewmen				FM = 159	3-Small
No: . (2)	tes .	1	tes /A	No	tes 
EXPENDABLE F	REQUIREMENTS	TRANSLATION MA	NEUVERABILITY	CARGO TRAN	SPORT RANGE
Interval	Rating	Interval	Rating	Interval	Rating
<u></u>	1- Low				
No	tes	1	tes	il .	ites
	ন্তৰ কৰিব জীৱনীয় <u>বিভাগ বিভাগ বিভাগ</u>	N	/A	N	I/A :

LEGEND: P - Published Data
E - Estimate



SUBSYSTEM NOMENCLATURE FREE SPACE ACTIVITY DEV LEVEL BOOM ATTACHMENT SYSTEMS DATA SHEET (Continued) VISABILITY NOTES Interval Rating (1) Assumed same as waist restraint 2-Obstructed (2) Primary and support astronauts Notes (3) EVA astronaut with 60ft umbilical \* DEPLOYED VOLUME (4) Appropriate attach points Interval Rating 1-Small (5) Backup (manual) STEM deployment system is provided DEVELOPED BY SPAR AEROSPACE PRODUCTS LIMITED. BOX 6022, TORONTO INTERNATIONAL AIRPORT, ONTARIO, TRINSPORT VELOCITY CANADA. Interval Rating Votes N/A CARGO MASS LIMIT Interval Rating Notes N/A CARGO STABILIZATION Interval Rating Notes N/A CARGO SIZE Interval Rating Notes N/A WORKSITE STABILITY (NORMAL) Interval Rating FM - 320 (E) 1-Stable Notes WORKSITE STABILITY (ROTATION) Rating Interval Reference Bib. No. 8, 27, 29, 25, 27, 29, 35, 57, 58, 63, 68, 71, 76, 78, 80, 96 90ft-lbs (P) l-Stable Notes REV -IEGEND: P - Published Data T - Typical E - Estimate Mx - Maximum

Mn - Minimum



F	REE SPACE ACTIVIT	rv	DEV A	SUBSYSTEM NO	MENCLATURE	
s	YSTEMS DATA SHE	ET	DEV LEVEL	ASTROGRID	/SHOES	
OPERATIONAL	LIFETIME	EMERCENCY PROVISIONS		ACTUATION FO	RCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited	<u></u>	l-None Req.	481bs (T, Mx)	2-Moderate	
Not	tes	Not	tes	(2)	otes	
ON-SITE TI	ME LIMIT	MA S	S	ACTUATION FOR	CE (ROTATION) ·	
Interval .	Rating	Interval	Rating	Interval	Ratine	
	l-Unlimited	41bs (T, E)	l-Light		2-Moderate	
Not	tes	Not	tes	No	ites	
WORKSITE FL	EXIBILITY ,	MAINTFNANCE TIM	E REQUIREMENTS	WORKSITE MASS	HANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
	3-Prepared W/S		1-None	>2351bs (P)	2-Moderate	
Not	tes	Not	tes	No	tes	
RAN	GE .	STOWED VOLUME		WORKSITE SIZE	HANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
,		70in <sup>3</sup> (T,E)	l-Small	12K in <sup>3</sup> (P)	2-Moderate	
Not N/	tes ⁄A	Not	tes	Notes		
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLATION VELOCITY		ACTUATOR POSI	TION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating	
	1-Unlimited				. 1-Accurate	
Not	tes	Notes N/A		No	Notes	
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIEN	TATION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating	
	I-No Redund. Req.	,			1-Accurate	
Not			tęs /A	No	otes	
CREW REQU	IREMENTS	TRANSLATION	STABILITY	WORKSITE RE	ACH ENVELOPE	
Interval	Rating	Interval	Rating	Interval	Rating	
2 Crewmen				FM ≈ 295	2-Moderate	
Not	tes		tes /A	No	otes	
EXPENDABLE R	EQUIREMENTS	TRANSLATION MA	NEUVERA BILITY	CARGO TRAN	SPORT RANGE	
Interval	Rating	Interval	Rating ·	Interval	Rating	
	1-Low					
1	tes	N	tes /A	i i	otes N/A	

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



	REE SPACE ACTIVIT				EV	4	. SUBSYS	TEM NOME	NCLATU	RE
SYSTEM	AS DATA SHEET (Co	ontinued)		LE	VEL	-13	ASTRO	GRID/SHOI	ES	
VISABI	LITY								, c	
Interval	Rating					NOTE	5			
	l-Unobstructed	(1)	Primar	y ar	ıd su	pport				
No1	tes		Pull f		_					
DEPLOYED	VOLUME .	(3)	Includ Astroa	les s rið	shoes weig	and a	astrogrid pprox07	plate (2 Nb/ip <sup>3</sup>	0"x20":	x.4")-
Interval	Rating	V	veighs	apr	rox.	1.21	bs and has	a volum	e of 2	Sin <sup>3</sup> .
	l-Small	DEVELA	OPED B	Y MC	DONN	ELL D	OUGLAS ASI	'RONAUTIC	COMPAI	NY,
Not	tes	SAINT	LOUIS	, MO	•				•	·
- TRANSPORT	VELOCITY									,
Interval .	Rating									
Not	es									
N/	'A									
CARGO MAS	S LIMIT									
Interval	Rating									
Not										
N/	A									
CARGO STAB	ILIZATION									
Interval	Rating									
Not										
N/										
CARGO S										
Intérval	Rating									,
										•
Not N/										Î
WORKSITE STABII Interval										
	Rating									
	1-Stable									į.
Not	es									,
WORKSITE STABILI	ITY (ROTATION)									
Interval	Rating									
<del></del>	l-Stable	Reference	Bib.	No.	14, 94,		7, 29, 52	, 57, 61,	63, 7	1,
Not	es				J <del>.</del> ,	20		•	•	
	··· ·· · · · · · · · · · · · · · · · ·						• • • • • • • • • • • • • • • • • • • •	REV -		
		P - Published E - Estimate	l Data	7 1		ypical Maximum				

Mn - Minamum



·	REE SPACE ACTIVIT	rv	DEV.	SUBSYSTEM NON	IENCLATURE
	YSTEMS DATA SHE		DEV LEVEL 5	STEM	
OPERATIONAL	LIFETIME	EMERGENCY P	ROVISIONS	ACTUATION FORCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rating
	1-Unlimited		1-None Reg'd.		
No t	ces	No	tes		tes /A
ON-SITE TI	ME ITMIT	MAS	is	ACTUATION FORC	
Interval	Rating	Interval	Rating	Interval	Reling
	l-Unlimited	28 lbs (E)	1-Light		
Not	Tes .	No. (1)	tes		tes /A
WORKSITE FL	EXIBI <b>LIT</b> Y	MAINTH NANCE TIM	E REQUIREMENTS	WORKSITE MASS H	ANDLING LIMIT
Interval	Rating	Interval	Rating	Interval	Reting
	3-Prepared W/S		l-None		
Not	tes	No.	tes		tes /A
RAN	Œ	STOWED	VOLUME	WORKSITE SIZE HANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Ratin
		1350 in <sup>3</sup> (E)	l-Small		
Not N		No. (1)	tes	)	tes /A
ENVIRONMENTAL	FLEXIBILITY	AVERACE TRANSLA	TION VELOCITY	ACTUATOR POSIT	TON ACCURACY
Interval	Rating	Interval	Rating	Interval	Rating
	l-Unlimited				
No1	tes	Notes		Notes	
	`	И	/A	n/a	
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating
	2-Redund. Req.				
Not	tes		tes /A	Notes N/A	
CREW REQU	IREMENTS	TRANSLATION	I STABILITY	WORKSITE REA	CH ENVELOPE
Interval	Rating	Interval	Rating	Interval	Rating
2 Crewmen (Mn					
Notes (2)		5	tes /A		/A 
EXPENDABLE R	EQUIREMENTS	TRANSLATION MA	NEUVERA BILITY	CARGO TRANS	PORT RANGE
Interval	Rating	Interval	Rating	Interval	Rating
	1-Low			60 ft (T)	2-Limited *
Not	tes	Notes N/A		Yo *Medium Range'	tes

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



Cr	REE SPACE ACTIVIT	v	_		SUBSYSTEM NOMENCLATURE
	AS DATA SHEET (Co		LEVEL LEVEL	5	STEM
					OTAM.
VISABI Interval	1	•		NOTE	······································
Interval -	Rating	-		MOIL	
	2-Obstructed	(1) Assume 60	ft STEM		
, Not	tes .				ossibly support) astronaut
DEPLOYED	VOLUME	(3) Backup (ma	ınual) de	ploym	ent provided
Interval .	Rating	MANUFACTURED BY	SPAR AE	ROSPA	CE PRODUCTS LIMITED,
4,610 in <sup>3</sup> (E)	1-Smal1	BOX 6022, TORON CANADA	TO INTER	OITAN	NAL AIRPORT, ONTARIO,
Not	res				·
TRANSPORT	VELOCITY				
Interval	Rating				
5 in/sec (P)	3-Slow				
Not	es				
CIRCO MASS	S ITMIP				
Interval	Rating				
	2-Moderate				
Not					
CARGO STABI	ILIZATION				
Interval	Rating				
	2-Moderate				
Not	es				
01000	``				
CARGO S Interval	Rating				
THOULAGE					
Not	l-Large es				
WORKSITE STABIL	ITY (NORMAL)				
Interval	Rating				
•					
Note	es				
N/i	Α				
WORKSITE STABILI	TY (ROTATION)				ļ
Interval	Rating				
		Reference: Bil	o. No. 8,	13,	19, 27, 29, 35, 52;
Note N/I			, 58, 63,	68,	77, 96.
1	international designation of the second				REV-

IEGEND: P - Published Data E - Estimate



·	REE SPACE ACTIVIT			SUBSYSTEM NON	IENCLATURE
	YSTEMS DATA SHE		LEVEL 5	RAILS	
OPERATIONAL	LIFETIME	EHERGENCY F	ROVISIONS	ACTUATION FOR	CE (NORMAL)
Interval	Rating	Interval	Rating	Interval	Rating
	1-Unlimited		1-None		
No.	tes	No	tes		tes /A
ON-SITE TI	ON-SITE TIME LIMIT MASS		S	ACTUATION FORCE (ROTATION)	
Interval	Rating	Interval	Rating	Interval.	Rating
·		100 lbs(E)	2-Moderate		
	tes /A	No (2)	tes		tes /A
WORKSITE FL	EXIBILITY	MAINTENANCE TIM	E REQUIREMENTS	WORKSITE MASS H	ANDLING LIMIT
'Interval	Rating	Interval	Rating	Interval	Rat (ng
	3-Prepared W/S only	None	1-None		
No	tes	No	tes		tes /A
RAN	Œ	STOWED	volume	WORKSITE SIZE H	ANDLING LIMIT
Interval	Rating	Interval	Rating	Interval	Rating
		995 in <sup>3</sup> (E)	1-Small		
Not N,		No (2)	tes	Not N	tes /A
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSIT	ION ACCURACY
Interval	Rating	Interval	Rating	Interval	Rating
	1Unlimited				· · · · · · · · · · · · · · · · · · ·
No	tes	Notes N/A		· Notes	
22224		<del> </del>		N/A ACTUATOR ORIENTATION ACCURACY	
DEPENDA Interval	Rating	TRANSLATION R Interval		Interval	
fliferval		Interval	Rating	Interval	Rating
	1-No Redund.				
Not	tes	1	tes /A	Notes N/A	
CREW REQU	IREMENTS	TRANSLATION		WORKSITE REA	<del></del>
Interval	Rating	Interval	Rating	Interval	Rating
2 Crewmen	·				
Notes (1)		<b>[</b>	tes /A		ces /A
EXPENDABLE R	EXPENDABLE REQUIREMENTS TRANSLATION MANEUVERABILITY		NEUVERABILITY	CARGO TRANS	PORT RANGE
Interval	Rating	Interval	Rating	Interval	Rating
	l-Low	<u></u>		60 ft.	3-Close Prox.
No	tes		tes /A	! Not : (3)	tes ·

LECEND: P -- Published Data
E -- Estimate



SUBSYSTEM NOMENCLATURE FREE SPACE ACTIVITY DEV LEVEL RAIL SYSTEMS DATA SHEET (Continued) VISABILITY ' NOTES Interval Rating Primary astronaut and support for umbilical or (1) 2-Obstructed life tether management. Notes (2) Dual aluminum Gemini handrails, 60 ft. in length. DEPLOYED VOLUME (3) SKYLAB umbilical length is assumed as limit. Interval Rating (4) Manual handrail translation used as base. 995 in<sup>3</sup>(E) 1-Small (5) "Shirtsleeve" transport capabilities used as a base. Notes .(2) . . DEVELOPED NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. TRANSPORT VELOCITY (CONTACT MAN/SYSTEMS INTEGRATION BRANCH, ASTRONAUTICS Interval Rating LABORATORY, MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, <2 ft/sec 3-Slow ALABAMA) Notes (4) CARGO MASS LIMIT Interval Rating 110 lbs(Mx, E) 3-Low Notes **(**5) CARCO STABILIZATION Interval Rating 2-Moderate Notes · CARCO SIZE Interval Rating \_ 3K in<sup>3</sup> (Mx, E) 3-Smal1 Notes (5) WORKSITE STABILITY (NORMAL) Interval Rating Notes N/A WORKSITE STABILITY (ROTATION) Rating Interval Reference Bib. No. 8, 13, 19, 25, 27, 29, 52, 57, 61, 63, 68, 69, 71, 75, 78, 79, 80, 94, Notes 96 N/A REV-T - Typical Mx - Maximum IEGEND: P - Published Data

Mn - Minimum

E - Estimate



F	REE SPACE ACTIVIT	·	DEV 7	SUBSYSTEM NOW	ENCLATURE .	
	YSTEMS DATA SHE	• •	DEV LEVEL 3	DOLLY & RA	AILS	
OPERATIONAL LIFETIME EN		EMERGENCY P	ROVISIONS	ACTUATION FOR	CE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rat ine	
	l-Unlimited		1-None Req'd.	_		
. No	tes ·	Notes		, \01	;es	
				Ŋ	/A	
ON-SITE TI	ME LIMIT	MAS	S .	ACTUATION FORC	ACTUATION FORCE (ROTATION)	
. Interval	Rating	Interval	Rating	Interval	Rat ring	
	1-Unlimited	4 lbs (E)	l-Light	·		
No -	tes	No ·	tes	Not N	res /A	
. WORKSITE FL	EXIBILITY	MAINTENANCE TIM	E REQUIREMENTS	WORKSITE MASS H	ANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rating	
			l-None			
	tes /A	. No	tes	. Not	ces /A	
RAN	GE	STOWED	VOLUME	WORKSITE SIZE HANDLING LIMIT		
Interval	Rating	Interval	Rating	Interval	Rating	
-		1680 in <sup>3</sup> (E)	1-Small			
Notes		No	tes	Not	es	
N.	/A			N	/A	
ENVIRONMENTAL	. FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSIT	ION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating	
` _ <del>_</del>	2-Limited	L •	,			
(1) (3)	tes	Notes N/A		Notes N/A		
. DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
,	2-Redundancy Reg'd.					
No	tes	Not	tes	Notes		
		N	/A	N	/A	
CREW REQU	TREMENTS	TRINSLATION	·	WORKSITE REA		
Interval	Rating	Interval	Rating	Interval	Rating	
2 Crewmen						
No	tes	. No		Not		
(2)			/A	<del></del>	/A	
EXPENDABLE F	7	TRANSLATION MA	T	. CARCO TRANS		
Interval	Rating	Interval	Rating	Interval	Rating 3-Close Prox.	
No	2-Medium res	No	tes	60 ft(E,Mx)	tes ·	
(5)		Notes N/A		(6)	i	

LEGEND: P - Published Data E - Estimate



## SUBSYSTEM NOMENCLATURE 3 FREE SPACE ACTIVITY DEV DOLLY & RAILS SYSTEMS DATA SHEET (Continued) LEVEL VISABILITY Interval. NOTES Rating 3-Very (1) Different thermal conditions on rails may cause Limited tolerance problems. Notes (2) Primary astronaut with support astronaut tending life tether or umbilical. DEPLOYED VOLUME Interval Rating (3) Each rail must be "one piece," Joints may cause tolerance problems. 1680 in<sup>3</sup>(E) 1-Small Notes (4) Assume astronaut translation velocity. (5) Rail slide frequently binds against rail causing TRANSPORT VELOCITY substantial increases in astronaut energy expendi-Interval Rating 2 ft/sec 3-Slow (6) Astronaut umbilical length for SKYLAB. Notes MANUFACTURED BY MARSHALL SPACE FLIGHT CENTER, ASTRO-NAUTICS LABORATORY, HUNTSVILLE, ALABAMA CARGO MASS LIMIT Interval Rating 1-Heavy Notes CARGO STABILIZATION Interval Rating 1-Stable Notes CARGO SIZE Interval Rating l-Large Notes WORKSITE STABILITY (NORMAL). Interval Rating Notes N/A WORKSITE STABILITY (ROTATION) Interval Reference: Bib. No. 8, 13, 19, 27, 29, 52, 57, 63, 68, 71, 78, 79, 80, 81, 94. Notes N/A REV-

E - Estimate



	DEE CDACE ACTIVIT				SUBSYSTEM NON	IENCLATURE
	FREE SPACE ACTIVIT SYSTEMS DATA SHE		TEAET DEA	3	PERSONNEL HARNESS	
OPERATIONAL		EMERCENCY P	ROVISIONS		ACTUATION FOR	CE (NORWEL)
Interval	Rating	Interval	Rating		Interval	Rat ing
	l-Unlimited		l-None Req	r'd		
, No	tes	No	tes		No N/	tes A
. ON-SITE TI	ME LIMIT	MAS	S		AÇTUATION FORC	E (ROTATION)
Interval	Rating	Interval	Rating		Interval	Rating
,	l-Unlimited	105 lbs (E)	2-Modera	te		
No	tes	No (3)	tes		Voi N/	res A
WORKSITE FL	EXIBILITY	MAINTHNANCE TIM	E REQUIREMEN	TS	WORKSITE MASS H	ANDLING LIMIT
Interval	Rating	Interval	Rating		Interval	Rating
2			l-None	<b>:</b>	}	
Not N/	1	No.	tes		Not N/	,
RAN	GE .	STOWED	VOLUME		WORKSITE SIZE H	ANDLING LIMÎT
Interval	Rating	Interval	Rating		Interval	Rating
		1025 in <sup>3</sup> (E)	l-Smal	.1		
Not N/		Notes (3)			Not N/	ces A
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLATION VELOCITY			ACTUATOR POSIT	ION ACCURACY
Interval	Rating	Interval	Rating		Interval	Rating
	l-Unlimited					
No.	tes	Notes		Notes		
220000	D	N/		·	N/A ACTUATOR ORIENTATION ACCURACY	
DEPENDA Interval		TRANSLATION R Interval			Interval	Rating
HICEL VAL	Rating	incerval	Rating		Interval	Marring
	1-No Rendund.		<u> </u>	<del>.</del>	At .	
Not	tes	Not			Not	
CREW REQU	IREMENTS	TR\NSLATION			n/ Worksite rea	
Interval	Rating	Interval	Rating		Interval .	Rating
2 Crewmen				•		
' Not	tes	No	es		Not	es
(1)		N/	'A		N/	'A
EXPENDABLE R	EQUIREMENTS	TRANSLATION MA	NEUVERA BILIT	Υ	CARGO TRANS	PORT RANGE
Interval	Rating	Interval	Rating		Interval	Rating
	2-Medium	·				3- Close Prox
No:	tes	No: N/	tes A		Not (2)	tes '

 LEGEND:
 P - Published Data
 T - Typical

 E - Estimate
 Mx - Maximum

 Mn - Minimum



E	REE SPACE ACTIVIT	v	p.E.I.		SUBSYSTEM NOMENCLATURE
	IS DATA SHEET (Co	•	rener DEA	3	PERSONNEL HARNESS
· VISABI	LITY				
Interval	Rating	•		NOT	res
	2-Obstructed		to use transport and one other crewma		
Not	es	handle umb	ollical a	nd/or	life tether.
		(2) Maximum Sk	TLAB umb	ılica	al length.
DEPLOYED		(3) Includes 6	(3) Includes 60 ft. of dual parallel Gemini handrails		
Interval	Rating	of aluminu			•
1025 in <sup>3</sup> (E)	1-Smal1	(4) Assumes sa	me rate	as tr	anslation.
Not	es .				
(3) TRANSPORT	VELOCITY			ED S	PACECRAFT CENTER,
Interval	Rating	HOUSTON, TEXAS	j .		
<pre>&lt;.2 ft/sec (E)</pre>	3-Slow				
Not	<u> </u>				
(4)					
CARGO MAS	S, LIMIT				
Interval	Rating	(			
150 lbs(E,Mx)	2-Moderate				
Not	es				•
CARGO STAB	ILIZATION	]			
Interval	Rating				
	2-Moderate	]			
Not	es .				
2122	oran .	}			
CARCO :	SIZE Rating	1			
6.7K in (E,Mx)	2-Medium	1			
Not	<u> </u>	{			
WORKSITE STABI	LITY (NORMAL)	1			
Interval	Rating	1			
Not	ces .	1			
N/	Ä				
WORKSITE STABIL		]			•
Interval	Rating	_			
		Reference Bib.			l9, 27, 29, 51, 63, 68, 71, 78, 94, 96
Notes N/A				•	REV-
N/	A				
	LEGEND:	P - Published Data E - Estimate	T - ' Mx - 1 Mn - 1		unt



	REE SPACE ACTIVIT				SUBSYSTEM NO	MENCLATURE
i	SYSTEMS DATA SHE		LEAET DEA	5	CLOTHESLI	NE.
OPERATIONAL LIFETIME		ENERGENCY P	ROVISIONS		ACTUATION FOR	CE (NORMAL)
Interval	Rating	Interval	Rating		Interval	Rating
	l-Unlimited		1-None Re	eq.		
No	tes	. No	tes		· No	tes
	,		•		. N	/A
ON-SITE TI	ME LIMIT	MAS	S		ACTUATION FORCE	E (ROTVILON)
Interval	Rating	Interval	Rating		Interval	Rat ing
	l-Unlimited	<b></b>	l-Light			
No.	tes	No	tes		<b>1</b>	tes /A
WORKSITE FI	EXIBILITY	MAINTENANCE TIM	E REQUIREMEN	TS	WORKSITE MASS I	ANDLING LIMIT.
Interval	Rating	Interval	Rating		Interval	Rating
	3-Prepared W/S		1-None			
No	tes	No	tes		1 ·	tes . /A
RA N	GE	STOWED	VOLUME		WORKSITE SIZE H	ANDLING LIMIT
Interval	Rating	Interval	Rating		Interval	Rating
	,		1-Small			
1	tes /A	Notes			. N/.	tes A
ENVIRONMENTAL	. FLEXIBILITY	AVERAGE TRANSLA	VERACE TRANSLATION VELOCITY			TION ACCURACY
Interval	Rating	Interval	Rating		Interval	Rating
	l-Unlimited					
No	tes	Notes N/A		Notes N/A		
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL		ACTUATOR ORIENT	ATION ACCURACY
Interval	Rating	Interval	Rating		Interval	Rating
	2-Red. Req.					
No	tes	Notes N/A		. Notes N/A		
CREW REQU	TREMENTS	TRANSLATION	STABILITY		WORKSITE REA	ACH ENVELOPE
· Interval	Rating	Interval	Rating		. Interval	Rating
2 Crewmen (Mn)	<u> </u>				·	
Į.	tes . (1)		tes N/A		i	tes /A
EXPENDABLE F	EXPENDABLE REQUIREMENTS		NEUVERA BILIT	Y		SPORT RANGE
Interval	Rating	Interval	Rating		Interval	Rating
No	1-Low tes	1	tes		50 ft(E)	3-Close Prox
<b></b>	St. of the Control of the Control	1	A/A		1	

LECEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum

. . . . .



	FREE SPACE ACTIVITY		DEV		SUBSYSTEM NOMENCLATURE	
	IS DATA SHEET (Co		LEVEL DEV	5	CLOTHESLINE	
VISABI	LITY		Construction of the last			
Interval	Rating			notes		
<u> </u>	- ODD 02 40 CEU   1>					
Not	Notes (Pr		and Supp	ort a	t least)	
DEPLOYED	VOLUME					
Interval	Rating.	MANUFACTURED TEXAS	BY NASA,	MANNI	ED SPACECRAFT CENTER, HOUSTON	
	1-Small					
Not	tes				•	
TRANSPORT	VELOCITY	į				
Interval	Rating					
`	3-Slow					
Not	tes					
		[				
CARGO MAS						
Interval	Rating	{				
	3-Low					
Not	tes					
CARCO STAB	ILIZATION	]				
Interval	· Rating					
	3-Unstable					
Not	tes					
CARGO	SIZE _	1				
Interval	Rating					
	3-Smal1					
Not	tes					
WORKSITE STABI	LITY (NORMAL)	1				
Interval	Rating	1				
Not	tes	1				
. 1	i/A					
WORKSITE STABIL	ITY (ROTATION)	1				
Interval	Rating					
		Reference:	Bib. No.		13, 19, 27, 29, 52, 57, 63,	
<b>3</b>	tes	]		68,	78, 80, 94, 96, REV -	
, N	1/A					
	LEGEND:	P - Published Data E - Estimate	Mx -	Typica Maximu Minimu	ım	

5-1-19 (b)



## 5.2 EV SYSTEM DATA SHEETS

Serpentuator	5-2-1	(a,	b)
Space Taxi	5-2-2	(a,	b)
Maneuvering Work Platform	5÷2-3	(a,	b)
Remora	5-2-4	(a,	b)
Humpty Dumpty	5-2-5	(a,	b)
Schmoo	5-2-6	(a,	b)
Modular EVA Work Platform	5-2-7	(a,	b)
Remote Manipulator Spacecraft	5-2-8	(a.	b)



				SYSTEM NO	MENCLATURE
	REE SPACE ACTIVIT	=	DEV 3	SERPENTUA	TOR
OPERATIONAL	LIFETIME	EMERGENCY P	ROVISIONS	ACTUATION FORCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rating
	l-Unlimited			10 lbs (T)	3-Low
'No	tes	No Backup As And Tether	tes stronaut /Umbilical	No	tes
ON-SITE TI	ME LIMIT	MAS		ACTUATION FOR	e, (rotación)
Interval	Rating	Interval	Rating	Interval	Rating
3.0 Hrs	3-Short*	<b>↔</b>	3 -неаvy	101bs (T) .	3-Low
	tes o. Lmt.	Not	tes	Yo	tes
-WORKSITE-FL	EXIBILITY	MAINTI NANCE TIM	E REQUIREMENTS	WORKSITE MASS !	NADELNE LIMIT
Interval	Rating	Interval	Rating	Interval	Rating
	l-Unlimited		Unknown		2-Moderate
	tes ial Attachment	Not	tes	٠ /٥	ites
RAN	GE	STOWED	VOLUME	WORKSITE SIZL I	HANDLING LIMIT
Interval	Rating	Interval	Rating	Interval	Rating
40ft (T)	3-Close Prox.	<b></b>	3-Large		2-Moderate
. \	tes	, hot	res	No	tes
FNVIRONMENTAL	FLEYIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSITION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating
	2-Limited*	4 fps (E)	2-Med.		2-Moderate
*Same as A	tes Astronaut	Notes Rotation at Bese - 1 rpm		Notes	
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating
	2-Redundancy Required		2-Med.		2-Moderate
No	tes	Notes		Notes	
CREW REQU	JIREMENTS	TRANSLATION	STABILITY	WORKSITE REA	ACH ENVELOPE
Interval	Rating	Interval	Rating	Interval	Rating
2			2-Mod. Stab.	FM-2400 (E)	l-Large
Notes 1 Primary 1 Backup (Umbilical Mgt.)		Not	tes	Notes 40ft Long	
EXPENDABLE F		TRANSLATION MA	NEUVERA BILITY	' CARGO TRAN	SPORT RANGE
Interval	Rating ,	Interval	Rating	Interval	Rating
			2-Med.		3-Ltd Close
-	tes /A .	Not	tes	, No	tes adius

LEGEND: P - Published Data E - Estimate



	FREE SPACE ACTIVIT	· <b>V</b>	551		SYSTEM NOMENCLATURE
	EMS DATA SHEET (C	i	LEVEL LEVEL	3	SERPENTUATOR
1/704 I	BILITY		- VA   1		
Interval	Rating				**
	1-Unlimited				
N	otes				
	0003				
, DESTOJE	D VOLUME	1			
Interval	Rating				
٠	Unknown				
N	otes				ASA MSFC ME LAB (W/SUPPORT D ASTRO SPACE LABS)
TRANSPORT	VELOCITY				
Interval .	Rating	]			
4fps (T)	3-Slow				
No	ntes	1			
	- · · · · · · · · · · · · · · · · · · ·	ļ			
	SS LIMIT	1			
Interval	Rating	-			
	2-Moderate	<u> </u>			
- No	otes				
CARGO STA	BILIZATION				
Interval	Rating				
	2-Mod. Stab.	<u> </u>			
No	otes				
CARGO	SIZE				
Interval	Rating				
- <del>-</del> .	2-Mod.				
No	otes				
WORKSITE STAB	ILITY (NORMAL)				
. Interval	Rating				
٠	2-Mod. Stab.				
No	otes				
MODROTAL CANAL	TTOW (DOMESTAN)				
Interval	LITY (ROTATION)  Rating				-
	2-Mod. Stab.	Poforone: 5-1	No. C	7 20	EQ 60 64
	otes ,	Reference Bib:	NO. 6,	1, 36,	טא, טט, ט4
	· -				REV -

LEGEND: P - Published Data
 E - Estimate



	REE SPACE ACTIVIT	rv		SYSTEM NOMENCLATURE		
	YSTEMS DATA SHE	•	LEVEL 2	SPACE TA	ΧI	
OPERATIONAL	OPERATIONAL LIFETIME		ROVISIONS	ACTUATION FORCE (NORMAL)		
Interva)	Rating	Interval	Rating	Interval	Rating	
5 Yr. (P)	1-unlimited		2-Intergal	25 lbs. (P)	2-Moderate	
Resupply cyc.		Not			tes 'al	
ON-SITE TI	ns per vear	25 ft. umb MAS		ACTUATION FORCE	(ROTATION)	
Interval	Rating	Interval	Rating	Interval	Rating	
8 hrs. (P)	2-limited	3474 lbs. (Wet) (P)	3-Heavy		2-Moderate	
	tes	No.	es	\\o	tes	
	ontingency	3198 lbs. Not *Includes 732 lbs		. (3		
WORKSITE FU	EXIBILITY	MAINTI NANCE TIM	E REQUIREMENTS	WORKSITE MASS	NADELAG FIALL	
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited		Unknown	500 lbs (E)	1-Heavy	
Not	tes	Not	es	\0	tes	
RAN	GE	STOWED	VOLUME	WORKSITE SIZE HANDLING LIMIT		
Interval	Rating	Inter val	Rating	Interval	Rating	
1½ mr (P)	2-Limited Med.	610 sq ft (E)	3-Large		1-Large	
%ot Any orbital d	1	Not 150" h x 77" x	•	. Notes		
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSITION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
	1-Unlimited	, <b></b>	l-Fast	<b></b> .	2-Moderate	
Not	ces	Notes		Notes		
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval	Rating	Interval	Rating	
	l-No Red. Req.		2-Medium		2-Moderate	
Not	tes	Not	es	Notes		
CREW REQU	IREMENTS	TRANSLATION	STABILITY	WORKSITE REACH ENVELOPE		
Interval	Rating	Interval	Rating	Interval	Rating	
1			2-Moderate	FM=400(2 ea)	l-Large	
Not	es	No <sub>1</sub>	es	No	tes	
			· · · · · · · · · · · · · · · · · · ·	Approx. 100" reach.		
EXPENDABLE R	EQUIREMENTS	TRANSLATION MA	NEUVERA BILITY	CARCO TRAYS	SPORT RANGE	
Interval	Rating	Interval	Rating	Interval	Rating	
263 lbs (E)	3-High	2-Medium		2-Limited Med		
No1	tes	Not	tes	Votes Same as range		
· · · ·	-	<u> </u>				

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



F	REE SPACE ACTIVIT	Y		DEV	6	SYSTEM NOMENCLATÜRE
	MS DATA SHEET (C	_	,	LEVEL	2	SPACE TAXI
VISABI	LITY		V-10-10-10-10-10-1		72.1	* **
Interval	Rating	1			NOTE	S
45 <sup>0</sup>	2-Obstructed	(1)		e Require	ement:	S
Nominal-up & d PEPLOYED Interval 610 sg ft (E)	tes clown  VOLUME  Rating  3-Large  tes  84"  VELOCITY  Rating  1-Fast	(2)	-Propella -O2 - 17 -H2O - 12 -Energy c 5.1K W 47.7K  Translati -Accelera Angula Transl Fore Lat. Rotati 5 & Stabil  Manipulate -2 bilate	nt - 234 lbs lbs onsumptic H/trip BTU/trip on/Stabil tion Rate r - 80/se ational /aft - 1. /vert onal Rate l50/sec2 ization A	lbs  izat:  c2  0 ft, 0.5 f (Concecurating)	ion /sec <sup>2</sup> :t/sec <sup>2</sup>
interval	i	1	•			
 Not	l-Heavy	SYSTE .AEROS	M DEVELOPI PACE CORP.	ED BY THE	LTV	ASTRONATICS DIV., LTV
110						ŕ
CARGO STAB	ILIZATION					
Interval	Rating					
	2-Mod. Stab.					
Not	es '					
_ CARGO S	SIZE					
. Interval	Rating	•				
	i-Large					
Not	es					
WORKSITE STABII	LITY (NORMAL)					
Interval	Rating					
	2-Mod. Stab.					
Not	es -					
WORKSITE STABILI	TY (ROTATION)					
Interval	Rating					
	2-Mod. Stab.	Refor	ence. Dib	No - 3	11 .	29,'31, 32, 51, 53,
Not	es	veret		97.	<b>T</b> T, 4	·9, 31, 32, 51, 53,
L	a stan saasan waxa sa	Tarket V	৯ সং: জন্মান ক্রমিনা কর	en een en en en en en en en en en en en		REV-
·		P - Publ E - Esti	ished Data mate	T — Ty Mx — Ma Mn — Mi	xımum	

5-2-2 (b)



	255 201 05 1 071 41			SYSTEM NO	SYSTEM NOMENCLATURE		
	REE SPACE ACTIVIT YSTEMS DATA SHE	ET LEVEL 3		MANEUVERING WORK PLATFOR	(MWP)		
OPERATIONAL LIFETIME		EMERGENCY P	ROVISIONS	ACTUATION FORCE (NORMAL)			
Interval	Rating	Interval	Rating	Interval	Ra†in <u>¤</u>		
1 yr (P)	l-Unlimited		2-Integral	25 lbs	2-Moderate		
Net 62 eighty-hour		No 25 ft. umbilic life support	tes al & ½ hr	No tong(grasp) 2	otes 5 lbs (3)		
ON-SITE TO	IE LIMIT	MAS	S	ACTUATION FOR	T (ROTATION)		
· Interval	Rating	Interval	Rating	Interval	Rating .		
8 hr (P)	2-Limited Long term	1690 lbs (P)	3-Heavy		2-Moderate		
Not		No	tes	No.	res		
Plus 2 hrs cont	ingency	1450 lbs (Dry)	(P)				
WORKSITE FU	EXTRULETY	MAINTI NANCE TIM	E REQUIREMENTS	WORKSITE MISS	NAMEL OF FIRST		
Interval	Rating	Interval	Rating	Interval	Rating		
	2-Limited		Unknown	575 lbs (T)	; 2-Moderate		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	pec. Interface		tes	λe	ites		
RANG	Œ	STOWED	VOLUME	WORKSITE SIZE	HANDLING LIMIT		
Interval	Rating	Interval	Rating	Interval	Rat ing		
6500 ft (P, T)	2-Limited Med. range	140 sg ft (E)	3-Large	480K sq in	l-large		
<b>1</b>	es ·	yo	tes	No	ites :		
Rescue cap. of							
ENVIRONMENTAL	FLEXIBILITY	VVLRAGE TRANSLA	TION VELOCITY	ACTUATOR POSI	HOV ACCURACA		
Interval	Rating	Interval	Rating	Interval	Rating		
	2-Limited	<b>~-</b>	l-Fast		2-Moderate		
\ot Same as astron		, Notes		Notes			
DEPLNDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY			
Interval	Rating	Interval	Rating	Interval	Rating		
	2-redundancy reg'd		l-High		2-Moderate		
. Not		No:	tes	, Notes			
CREW REQU	TREMES		I CONDITION	WORKSITE REACH LAVI'LOPL			
Interval	Rating	TRANSLATION Interval	Rating	WORKSITE RE	Rating		
1	ra cruig	Interval	2-Mod. Stab.	FM=260 (E)	2-Medium		
Not	es	No	<u> </u>	<del>                                      </del>	tes		
Notes		Notes (2)		%ores 2 ea. Manipulator reach-52 in.			
EXPENDABLE R	QUIREMENTS	TRANSLATION MANEUVERABILITY		1	SPORT RANGE		
Interval	Rating	Interval	Rating	Interval	Rating		
246 lbs (P)	2-Medium		2-Medium		2-Limit Med. close		
Not (1)	es	No (2)	tes	\(	otes		

LEGEND: P - Published Data
E - Estimate

T - Typical Mx - Maximum

Mn - Minimum

50	REE SPACE ACTIVITY	v		DEV		SYSTEM NOMENCLATURE
	IS DATA SHEET (Co			LEVEL	3	MANEUVERING WORK PLATFORM (MWP)
VISABII	LITY	Advisor en la fic	era an estado estado estado estado estado estado estado estado estado estado estado estado estado estado estado			
Interval	Rating				NOTE	s
	1-Unobstruct.	(2)				,
Not	es	<pre>(1) Expendable requirements:    -Propellant - 210 lbs</pre>				5:
			-0 <sub>2</sub> - 2 1 -H <sub>2</sub> 0 - 26			• •
DEPLOYED			-h <sub>2</sub> 0 - 20 -LiOH - 7			
Interval.	Rating	(2) 1	Pranelati	on/stabi	1:+	ion (B).
300 sq ft(E)	3-Large		Accelera	tion rate	e	, , ,
No t	es		transl	ational		l, & yaw) - 18 <sup>0</sup> /sec <sup>2</sup> avg.
TRANSPORT I	VELOCITY		Fore	/aft - 1. vert (	.0 ft 0.5/s	/sec² ec²
Interval	Rating	_	Rotation	al Rate	(comm	and)
	l-Fast	-	pitch, Stabiliz	roll, & ation Aco	yaw curac	$-15^{\circ}/\text{sec. max.}$ y $-\frac{1}{2}2^{\circ}$ (automatic)
Not	es	(3) M	Manipulat	ors/Grapp	olers	· ·
CARGO MASS	TIMIT			rd & 1 a		•
Interval	Rating				E LTV	ASTRONAUTICS DIV., LTV
575 lbs (P)	2-Moderate	AEROSF	PACE CORP	•		
Not	es	ļ				
CARGO STAB	ILIZATION					•
Interval	Rating_					
	2-Mod. Stab.					
Not	es					
CARGO S	SIZE					:
Interval	Rating					
480K sq in	2-Medium					,
Not	es					
horksite stabii	LITY (NORMAL)					
Interval	Rating					
	2-Mod. Stab.					
Not	es					
						•
WORKSITE STABIL						
Interval	Rating					
	2-Mod. Stab.		' 1			
Not	es	Refere	53.	b. No. 3, , 54, & 9	97.	29, 31, 32, 51, REV-

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Mininum



	REE SPACE ACTIVIT				MENCLATURE
5	SYSTEMS DATA SHE		DEV LEVEL	REMOR	A
	OPERATIONAL LIFETIME		ROVISIONS	ACTUATION FORCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rating
	Unknown		Unknown		2-Moderate
No	tes	. No	tes	(1)	otes
ON-SITE TI	ME LIMIT	MA S	S	ACTUATION FOR	CI (ROTATION)
Interval	Rating	Interval	Rating	Interval	Rating
4 hrs (P)	3-Limited Short term	520 lbs. (Loaded)*	3-Heavy		2-Moderate
No.	tes	Not *(P), 260 lbs		\c (1)	res
WORKSITE FL	EXIBILITY	MAINTLNANCE TIM	E REQUIREMENTS	WORKSITE MASS	IVADLING LIMIT
Interval	Rating	Interval	Rating	Interval	Rat in
	2-Limited*		Unknown		2-Moderate
\o *Special inte	tes rface	Not	ces	, Ve	tes
RIN	CE .	STOWED	VOLUME	WORKSITE SLEET	HANDLING LIMIT
Interval	Rating	Inter val	Rating	Interval	Ratini
1000 ft (P)*	2-Limited, Mcd.	43 cu ft (E)	2-Moderate		2-Moderate
701	tes	Not	es	No	tes
*Tethered		*Height-6ft, D	ıa3ft (P)		,
FNVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POST	FION ACCURACY
Interval	Rating	Interval	Rating	Interval	Rating
: 	2-Limited*		2-Medium ·	÷=	2-Moderate
\oo *Hıgh radiatio		Notes		Notes	
DEPENDA	BILITY	TRANSLATION R	ATE CONTROL	ACTUATOR ORIENTATION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating
	Unknown		2-Medium		2-Moderate
Vot	es	Notes		Notes (1)	
CREW REQU	IREMENTS	TRANSLATION	STABILITY	WORKSITE REACH ENVELOPE	
Interval	Rating	Interval	Rating	Įnterval	Rating
1*			2-Moderate		3-Small
Not *Suited	es	Not	es	%o	tes
EXPENDABLE REQUIREMENTS		TRANSLATION MA	NEUVERA BILITY	CARCO TRAN	SPORT RANGE
Interval	Rating	Interval	Rating	Interval	Rating
	Unknown		2-Medium	1000 ft*	2-Limited, Med.
Notes		Not	es	No *Tethered	tes

LECEND: P - Published Data
E - Estimate



	EE ODA OF A OTHER				SYSTEM NOMENCLATURE
FREE SPACE ACTIVITY SYSTEMS DATA SHEET (Continued)			LEVEL DEV		REMORA
		, , , , , , , , , , , , , , , , , , , ,			
VISABII		_		NOTE	ra
Interval	Rating			MOTE	.s
360 <sup>O</sup> (P)*	1-Unobstruct.	(1). Manipulat	-or - 2	o= ar	me.
Not		Anthropon	orphic g	loves	- 2 ea.
*Clear glass do		SACORM DECIDOS	an av mar	RELI	AEROSYSTEMS CO., BELL
DEPLOYED		AEROSPACE COR			1121102101212 001, 12-22
Interval	Rating				
43 cu ft*(E)	2-Moderate				
Not	l l				
*Height-6ft, Di					
TRINSPORT V	Rating				
	2-Medium				
Vot	es				
. CARCO MASS	LIMIT				
, Interval	Rating				
· · · · · · · · · · · · · · · · · · ·	2-Moderate				
Not					
Ì					
CARJO STAB	I LIZATION				
Interval	Rating				
	2-Mod. Stab.				
Not					
CARGO	SIZE	•			
Interval	Rating				
	2-Medium ,				
Not	es				
<b></b>					
NORKSITE STABIL					
Interval	Rating				
	2-Mod. Stab.				
Not	es				
	<del></del>				
WORKSITE STABIL	T				
Interval	Rating				
	2-Mod. Stab.				
Not	CCS .	Reference: B	lb. No. 5	;	. REV-
L	فالمراجع والمناوات والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع	Wererence: P.		, ,	

 LEGEND:
 P - Published Data
 T - Typical

 E - Estimate
 Mx - Maximum

 Mn - Minimum



	FREE SPACE ACTIVI			SYSTEM N	OMENCLATURE
	SYSTEMS DATA SHEET		LEVEL		Y DUMPTY
OPERATIONAL LIFETIME		E'IL ROENCY	PROVISIONS	ACTUATION FORCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rating
<del></del>	Unknown		Unknown		l-High
\0	tes	Ne	otes		Notes
05-SITE FI	ME LIMIT	MA.	SS	ACTUATION FO	RCI_ (ROTATION)
Interval	Rating Limited	Interval	Rating	Interval	Rating
30 hrs*(P)	Limited 2-Long term		3-Heavy		1-High
\o	tes	, No	otes		Notes
WORKSITI FI	EVIBILITY	MAINTLNANCE TH	4L REQUIREMENTS	WORKSITE MASS	HAMBLE'S SLIME
Interval	Rating	Interval	Rating		Ratu
	2-Limited*		Unknown		i l-Heavy
λο *Special int	tes erface	. No	ites		iotos
RAN	GE	STOWED	VOLUME	WORKSITE SIZE HAMPLING LIMIT	
<u>Interval</u>	Rating	· Interval	Rating	Interval	Ratini
	Unknown		Unknown		l-Large
\o:	tes	No	tes .	Notes -	
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLA	TION VELOCITY	ACTUATOR POSITION ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating
	l-Unlimited	•	2-Medium	, <del></del>	1-Accurate
\01	tes	No	tes	λ	otes
DEPFYDV	BILITY	TRANSLATION F	MATE CONTROL	ACTUATOR ORIENTATION ACTURNOS	
Interval	Rating	Interval	Rating	Interval	Rating
	Unknown		2-Medium		l-Accurate
Not	tes	No ·	tes	Notes	
CREW REQU	IREMENTS	TRANSLATION	STABILITY	WORKSITE RI	EACH LINVI LOPE
Interval	Rating'	Interval	Rating	Interval	Rating
1 (P)			2-Mod. Stab.	,	l-Large
\ot	es	No	tes	(1)	otes
EXPENDABLE R	EQUIREMENTS	TRANSLATION MANEUVERABILITY		CARGO TRAN	ASPORT RANGE
Interval	Rating	Interval	Rating	Interval	Rating
	Unknown	'	1-High		2-Limited*
Not	es	Not	tes		otes .

LUGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



The state of the s		and the second s	DEV		SYSTEM NOMENCLATURE
1	FREE SPACE ACTIVITY SYSTEMS DATA SHEET (Continued)				HUMPTY DUMPTY
	•	Triplace.	LĖVEL		
VISABI	T			NOTE	
Interval	Rating		_		
	l-Unobstruct.	(1) Number of - 3 ea. n	f manipul mechanica	ators 1 (wo	erk)
Not	les	- 3 ea. n	nechanica.	l (an	choring)
PEPLOYED	Wolling	- 2 ea. a	nthropom	orphi	c gloves .
Interval	Rating	SYSTEM PROPOSI	ED BY DOU	GLAS	AIRCRAFT COMPANY.
	3-Large				
Not					
TRANSPORT	VELOCITY				
Ințerval	Rating				
	l-Fast				
` . Not	es -				
CARGO MAS					
, Interval	Rating				
	1-Heavy				
Not	es				
CARCO STAB	FIT7ATTON				
Interval	Rating				
	2-Mod. Stab.				
Not	L				İ
CARCO	SIZE				
Interval	Rating				
	l-Large				
Not	es				
horksite stabi	LITY (NORMAL) Rating				
Interval	l-Stable				
Not	<u> </u>				:
NORKSITE STABIL	TTY (ROTATION)				
Interval	Rating				
	l-Stable				
Not	·				
			b. No. 5	<u>,                                     </u>	REV-

IEGEND: P - Published Data T - Typical E - Estimate Mx - Maximum

Mn - Minimum



,	REE SPACE ACTIVI	TV	5511	SYSTEM NON	MENCLATURE	
i	YSTEMS DATA SHE		DEV LEVEL 2	SCHMOO	ı	
OPERATIONAL	OPERATIONAL LIFETIME		EMERGENCY PROVISIONS		ACTUATION FORCE (NORMAL)	
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited	N/A	<b></b>	600 lbs. Mx(P)	1-High	
you	tes	Not	es	. No	tes	
ON-SITE TI	ME LIMIT	· MAS	5	ACTUATION FORC	E (ROTATION)	
Interval	Rating	Inter val	Rating	Interval	Rating	
	Uknown	11,300 lbs. (wet) *	3-Heavy		1-High	
Not	tes	Not *(P) 7500		Vo: (2	res 2)	
WORKSITE FU	EXIBILITY	MAINTLNANCE TIM	E REQUIREMENTS	WORKSITE MASS H	ANDLING LIMIT	
Interval	Rating	Interval	Rating	Interval	Rat ing	
	l-Unlimited		Unknown		l-Heavy	
Уот.	Ces	Not	es	- \0	tes	
RAN	GE	STOWED	VOLUME	WORKSITE SIZE H	ANDLING LIMIT	
'Interval	Rating	Interval	Rating	Interval	Rating 1	
	l-Unlimited	3240 cu.ft.(E)	3-large		l-large	
Not	tes	Not *Oblated sph 15 ft. W.& 18	es eroid - (P) ft. Lg. x 12h.	Notes		
ENVIROAMENTAL	FLEXIBILITY	AVERAGE TRANSLATION VELOCITY		ACTUATOR POSIT	TON ACCURACY	
Interval	Rating	Interval	Rating	Interval	Rating	
	l-unlimited*		1-Last	<b></b>	1-Accurate	
Vot *Partıcular hıgh radi	es ly suited for ation area	Notes		Notes		
DEPENDA	BILITY	TRANSLATION R	TE CONTROL	ACTUATOR ORIENTATION ACCURACY		
Interval.	Rating	Interval	Rating	Interval	Rating	
			1-High .	ALIQ SALA	1-Accurate	
Not	ces	Notes		Notes		
CREW REQU	IREMENTS	TRANSLATION	STABILITY	WORKSITE REACH ENVELOPE		
Interval	Rating	Interval	Rating	Interval	Rating	
N/A*			2-Med.	FM=1080 (ea)	l-large	
*unmanned,	Notes *unmanned, controller .equired, IVA or gnd. (1)		Notes		tes g. Arms (2 ea)	
EXPENDABLE R	EQUIREMENTS	TRANSLATION MANEUVERABILITY		CARGO TRANS	PORT RANGE	
Interval	Rating	Interval	Rating	Interval	Rating	
	Unknown		2-Mod. Stab.		l-Unlimited	
Not	ces	Not	es	No	tes	

LECEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



FREE SPACE ACTIVITY			DEV		SYSTEM NOMENCLATURE		
SYSTEMS DATA SHEET (Continued)		i i	DEV LEVEL	2	SCHMOO		
VISABI	LITY						
Interval	Rating		-	NOTES	•		
l-Unobstructed		(1) Remotely operated service Module for maintenance (2) 2 each stabilization arms 2 each manipulator arms (18 ft 1g) (3) 2 complete TV systems - steroptical color TV (3d) - Black & White TV (2d)					
Votes (3)							
DEPLOYED VOLUME							
Interval	Rating	SYSTEM PROPOSED BY LOCKHEED MISSILES & SPACE COMPANY					
3240 cu. ft. (E) *	. l-Large						
Notes *oblated spheroid - 15 ft.W. x 18 ft. Lg. x 12 ft. H.							
TRINSPORT							
Interval	Rating						
	1-Fast						
Not	ces						
CARCO MASS	S LIMIT						
Interval	Rating						
	l-Large				,		
Not	Notes						
CARGO STAB	ILIZATION				•		
Interval	Rating						
	2-Mod. Stab.						
Not	Notes						
. CARCO S	SIZE						
Interval	Rating						
	l-Large						
Not	Notes						
NORKSITE STABILITY (NORMAL)							
Interval	Rating						
	2-Mod. Stab.						
Notes							
WORKSITE STABILITY (ROTATION)							
Interval	. Rating						
	2-Mod. Stab.						
Notes			_				
		References: Bi	b No. 30,	,92 &	93 REV		

T - Typical Mx - Maximum Mn - Minimum IEGEND: P - Published Data
E - Estimate



FREE SPACE ACTIVITY					SYSTEM NO	MENCLATURE	
	ET	DEV LEVEL	2	MODULAR EVA WO	RK PLATFORM		
OPERATIONAL LIFETIME		E'ERGENCY PROVISIONS			ACTUATION FORCE (NORMAL)		
Interval	Rating	Jntei val	Rating		Interval	Rating	
	, Unknown		2-Integrated*		25 lbs (P)	2-Moderate	
Notes		Notes *4 hrs emergency			Notes		
ON-SITE TIME LIMIT		MASS			ACTUATION FORCE (ROTATION)		
Interval	Rating	Interval	Rating		Interval	Rating	
4 hrs (P)*	3-Limited, Short term	1052 lbs (P)	3-Heavy			3-Low	
\ot *Plus 4 hrs eme		Notes (3)			٨٥	Notes	
WORKSITE FLA	EXIBILITY	MAINTLNANCE TIME REQUIREMENTS			WORKSITE MASS HANDLING LIMIT		
Interval	Rating	Intel val	Rating		Interval	Rat ine	
<u>.</u>	2-Limited*		Unknown			2-Moderate	
Not *Special inter	• •	Notes			Notes		
RANG	ac	STOWED	OWED VOLUME		WORKSITE SIZL	ANDLING LIMIT	
Interval	Rating	Inter val	Rating		Interval	Rat ing	
7000 ft (P)*	-Limited Med.	216cu.ft.(E)*	2-Mođera	te		2-Moderate	
*10000 ft. w/ ext. propul. cap. module		Notes *6 ft x 6 ft x 6 ft			Notes		
ENVIRONMENTAL	FLEXIBILITY	AVERAGE TRANSLATION VELOCITY			ACTUATOR POSITION ACCURACY		
Interval	Rating	Interval	Rating		Interval	Rating	
	2-Limited*	15-20 ft/1bs	2-Medıu	m		2-Moderate	
Notes *Same as suited astronaut'		Notes			Notes		
DEPENDABILITY		TRANSLATION RATE CONTROL		ACTUATOR ORIENTATION ACCURACY			
Interval	Rating	Interval	Rating		Interval	Rating	
	Unknown	.5 ft/sec <sup>2</sup>	2-Mediu	m		2-Moderate	
Notes		Notes			Notes		
CREW REQUIREMENTS		TRANSLATION STABILITY		WORKSITE REACH ENVELOPE			
Interval	Rating	Interval	Rating		Interval	Rating	
1		·	2-Mod. S	tab.	FM=240 (ea)*	2-Medium	
Notes Suited astronaut		Notes			Notes *525 cu ft (P)		
EXPENDABLE REQUIREMENTS		TRANSLATION MANEUVERABILITY		CARGO TRANS	SPORT RANGE		
Interval	Rating	Interval	Rating		Interval	Rating	
29 lbs/4 hrs(E)	29 lbs/4 hrs(E) 2-Medium		2-Medium		7000 ft	2-Medium	
Notes (2)		Notes			Notes See range		

LEGEND: P - Published Data T - Typical
E - Estimate Mx - Maximum
Mn - Minimum



SYSTEM NOMENCLATURE FREE SPACE ACTIVITY DEV MODULAR EVA WORK PLATFORM SYSTEMS DATA SHEET (Continued) LEVEL VISABILITY NOTES Interval Rating 2-Obstructed (1) Utilizes 3 worksite anchors with adhesive pads. Notes Limited by platform (2) 1551 watt-hrs of electrical energy (P) PEPLOYED VOLUME (3) Optional configurations: Interval Rating -Ext. propulsion capability--180 lbs. -Long range rendezvous module--73 lbs. 216 cu ft(E)\* 2-Medium SYSTEM DEVELOPED BY THE BENDIX CORPORATION Notes \*Approx. 6ft x 6ft x 6ft TRANSPORT VELOCITY Rating Interval 2-Medium Notes CARGO MASS LIMIT Interval Rating 1-Low Notes CARGO STABILIZATION Interval Rating 2-Mod. Stab. Notes - CARGO SIZE Interval Rating 2-Medium Notes WORKSITE STABILITY (NORMAL) Interval Rating 2-Mod. Stab. Notes WORKSITE STABILITY (ROTATION) Interval Rating 2-Mod. Stab. Notes Reference: Bib. No. 9 REV-

T - Typical Mx - Maximum

Mn - Minimum

LEGEND: P - Published Data

E - Estimate



	EDEC CRACE ACTIV	~~		SYSTEM NOMENCLATURE		
FREE SPACE ACTIVITY SYSTEMS DATA SHEET			rever 3	REMOTE MANIPUL	ATOR SPACECRAFT	
OPERATIONAL LIFETIME		EMERGENCY PROVISIONS		ACTUATION FORCE (NORMAL)		
Interval	Rat me	Interval	Rating	Interval	Rating	
3 Yrs (P)	1-Unlimited			.15lbs (P)	3-Low	
Notes		1 .	tes /A	\lambda(1)		
ON-SITE TIME LIMIT .		MAS	35	ACTUATION FORCE (ROTATION)		
Interval.	Rating	Interval	Rating	Interval	Rating	
	2-Limited Long Term	5401bs (T)	2-Moderate	40in. lbs.(E)	2-Moderate	
Notes		No	tes	(1)	Notes (1)	
WORKSITE P	UANTBLLITY	MAINTI NANCE TIME REQUIREMENTS		WORKSITE MASS HANDLE AS EMIT		
Interval	Rating	Interval	Rating	Interval	Ratins	
	1-Unlimited		Unknown		2-Moderate	
Notes .		Notes		Notes		
RI	NGE	STOWED VOLIME		WORKSITE SIZE HYNDLING LIMIT		
Interval	Rating	Interval ·	Rating	. Interval	Rat in,	
	l-Unlimited	24cu.ft. (E)	2-Moderate		2-Moderate	
Notes		ho	tes .	Notes		
ENVIRONMENT	ENVIRONMENTAL FLEXIBILITY		TION VELOCITY	ACTUATOR POSITION ACTUATOR		
Interval	Rating	Interval	Rating	Interval	Rating	
	l-Unlimited		1-Fast	`	2-Moderate	
Votes		Notes		Notes		
PEPENDABILITY		TRANSLATION RATE CONTROL		ACTUATOR ORIENTATION ACCURACY		
Interval	Rating	Interval ·	Rating	Interval	Rating	
			2-Med.	FM = 200 (E)	2-Moderate	
hotes		Notes		Notes 40 in. reach		
CREW REQUIREMENTS		TRANSLATION STABILITY		WORKSITE REACH ENVILOPE		
Interval	Rating	Interval	Rating	Interval '	Rating	
			2 Mod. Stab.		2-Med.	
Nores N/A Unmanned		Notes		Notes Same as Range		
LXPENDABLE REQUIREMENTS		TRANSLATION MA	NEUVERA BILITY	CARGO TRANSPORT RANGE		
Interval	Rating	Interval	Rating	Interval	Rating	
			2 - Med.		2-Limited Me	
Notes Energy consumption-780 watts (peak), 167 watts (Aug)		Notes		Notes Same as range		

LECEND: P - Published Data T - Typical E - Estimate Mx - Maximum Mn - Minimum



FREE SPACE ACTIVITY SYSTEMS DATA SHEET (Continued)				DEV LEVEL	3	SYSTEM NOMENCLATURE		
			Corre			REMOTE MANIPULATOR SPACECRAFT		
				or and the second second				
VI SABILLITY .					NOTE	es		
Interval	Rating	(1) Man	ıpu.	lators (	2)			
·	l-Unobstructed	Ele	ctr	ical bil	atera	al (closed loop position		
Not	i	con	cro.	r with to	ch force feedback)			
Steropt		SYSTEM BEING DEVELOPED BY GENERAL ELECTRIC CO.,						
PLPLOYED		SPACE SYSTEMS DIVISION						
Interval	Rating					•		
24 cu. ft. (E)	2-Med.							
Not	es							
, marchanana i	FLOCITY							
• TRINSPORT I	Rating							
	2-Med.							
		•						
Yot	es ·							
CARGO MASS	LINIT	Ì						
Interval	Rating							
	2-Moderate							
Not								
The state of the s								
ÇARGO STAB	ILIZATION							
Interval	Rating							
	2-Mod.Stab.					`		
Yot	ies .							
CARGO	SIZE							
Interval	Ratung							
	2-Med							
Vot	res							
		]						
NORKSITE STABI								
Interval	Rating	<u> </u>						
	2-Mod. Stab.	j						
Notes		}						
		<u> </u>						
WORKSITE STABIL	ITY (ROTATION)	] .						
Interval	Rating	1						
2-Mod. Stab.		Reference E	₃ib.			16, 17, 42, 43, 44, 47, 56, 66		
No	tes	1		1	•	REV -		
			OPETALS			A medicine profit is the Commission of the total control of the commission of the co		
	LEGEND:	P - Published! E - Estimate	l)a ta	Mx -	Typica Maximu Minimu	um		